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NOVEMBER 1999

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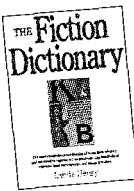
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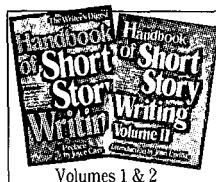
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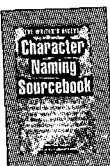


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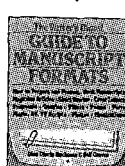


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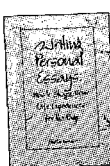
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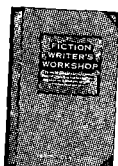
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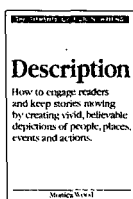
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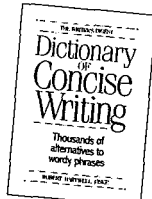
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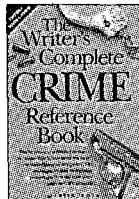
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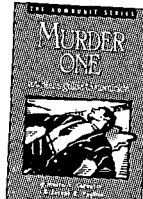
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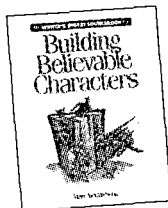
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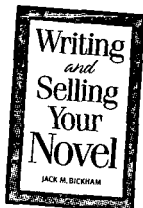
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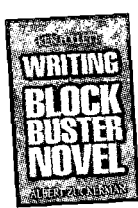
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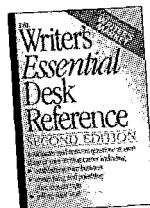
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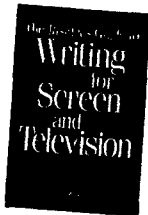
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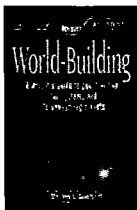
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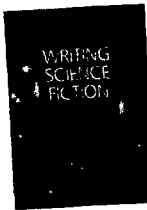
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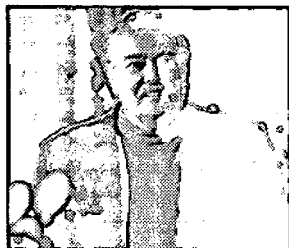
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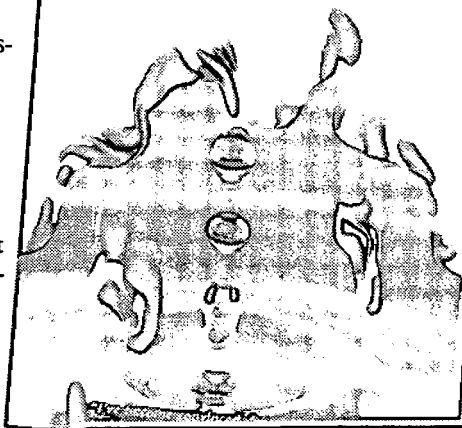
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TECHNOLOGICAL TEMPTATION

Once people acquire the ability to do something that offers at least one benefit, there's a powerful temptation to rush right out and use it. It's such a heady feeling that it seems just too much bother to think about such pesky details as what side effects such action might have, or how those might clash with long-held principles.

Consider, for example, the current fashion among some city governments of installing lots of remotely controlled video cameras in public places, with their output continually monitored by the local police and stored on videotape in case it's ever needed as evidence.

What's Big Brother got that we haven't got?

Answer: very little. When George Orwell wrote *1984*, in 1949, the ability to do such things was pure science fiction: not feasible with then-current technology, but clearly possible in principle. Today the kind of surveillance Orwell imagined is even easier than he ever dreamed, so it's hardly surprising that some governments are beginning to use it. What is surprising is the eagerness with which the notion is being accepted in some circles.

Oh, it's controversial, all right. Some people do remember *1984* (as distinct from 1984) and still recognize the dangers it warned against. Predictably, in the one case I'm most familiar with, there have been loud cries of "Racism!" because the locations planned for the first cameras happen to be in areas with largely black populations. Those com-

plainants, I respectfully submit, are barking up the wrong tree. They're objecting to something they should be objecting to, but for the wrong reasons. Those camera locations, we are told, were chosen not because of the color of their population, but because of their high crime rates—and that argument is supported by plausible and checkable statistics. If the cameras are justifiable as an anticrime measure, it makes perfectly good sense to put them first in high-crime areas, and the racial make-up of people in those places is irrelevant.

On the other hand, if the cameras are *not* justifiable as an anticrime measure, that's true in *all* areas. Again, the racial make-up of people in those areas is irrelevant, and the cameras shouldn't be deployed *anywhere*.

So the real question, leaving race completely out of the picture, is: Are the cameras justifiable as an anticrime measure?

Probably most of us would still object strongly to any proposal that we move immediately to the kind of full-coverage surveillance Orwell envisioned: around the clock, in all places public and private. But smaller steps in that direction seem to be much more readily accepted, especially by people who don't expect to be directly affected by them. I've heard far more objections on the basis of alleged racism than on the basis of the general principle that the government should not be snooping unnecessarily on *any* of its citizens. A surprising number of people

actually seem to approve of the camera plan, subject only to the NIMBY ("Not In My Back Yard") qualification. They think the cameras are a great idea in high-crime areas. That won't affect *them* because they don't *live* in those high-crime areas. (And in many cases there probably really *is* a streak of racism in *that* attitude.)

Officials pushing the plan say, in soothing tones and with perfectly straight faces, the most astounding things to make it more palatable. "People benefit greatly from having safe streets." "We target criminals. That's it." The implication being that anyone who is not a criminal should be perfectly happy having his or her every move monitored and taped by the police.

In a similar vein, I've heard it argued that no one should *expect* any privacy in a public place. I can only conjecture that the people who say such things are either too young to have learned, or too old to remember, any of the many perfectly innocuous reasons why decent people might reasonably seek a few moments of privacy in a public park.

It is, of course, true that people benefit from having safe streets. But it's also true, as John W. Campbell often said, that you can't do just one thing. Safe streets are desirable; but in contemplating any plan to achieve them, you have to look at what price you're paying to get them, and seriously consider whether the gain is worth the cost. The philosophy that "Anything that will de-

ter crime in the city will be beneficial" (a quote attributed, perhaps surprisingly, to an NAACP official) is simplistic, at best.

Or is it? Maybe he's right. In that case, we should not only embrace monitoring cameras in a few public places, but actively seek other ways we can apply the same principle. What *else* can we do that could decrease crime, and therefore be Good?

Well, for starters, why stop with a few cameras in a few particularly high-crime spots? Let's put them *everywhere*: on every street corner, with coverage of every foot of street and sidewalk, every yard and every vacant lot. Even low-crime areas have *some* crime—or may eventually, if you watch them long enough. Sure, it'll cost; but anything that reduces crime is worth it. Right? Besides, if we buy enough of them, maybe we can get a good quantity discount. . . .

And why stop outside? If we buy even more, we should be able to get an even better quantity discount. Let's put them in every room of every house, and make Uncle George really happy! Sure, that will mean that the police will be able to watch lots of things that people are used to doing privately; but they'll only be interested in criminals, so the rest of us have nothing to worry about. Right? After all, anything that reduces crime is beneficial. . . .

Of course, with all these cameras watching everybody, the police may initially catch so many criminals that our al-

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ready backlogged courts can't keep up. Eventually, one presumes, that problem will go away because everyone will be too afraid of being caught to do anything that has the slightest possibility of breaking a law. (A man in New York City was recently fined \$1000 for letting his children climb a tree in a park. When he said he didn't know it was illegal, a parks official said, "Ignorance of the law is no excuse" and "If we listed every rule, we'd have more signs than trees.") In the meantime, if we really want to do everything possible to reduce crime, why not give beat patrolmen broad discretion to mete out justice on the spot? That should further hasten the process of making people too afraid to contemplate committing any crime, however minor!

And why stop with outright crime? There are other activities that don't (yet) violate any laws, but still have societal costs. The same surveillance technology that can help stop crime can help stop those, too. Is it not our duty to use them to do so?

For example, a reader recently objected to my being "horrified" (as he read another of these essays) "that an employer might request no smoking at home." My actual objection was not to

employers "requesting," but "demanding." An employer has a right to *request* anything at all. He does not necessarily have any right to expect—much less force—compliance with the request.

In this instance, my critic thought it perfectly reasonable for an employer to insist on employees' not smoking even at home, since the employer pays for health insurance for the worker and his or her family (who are exposed to second-hand smoke). It's almost certainly true that everybody's insurance premiums could be lower if nobody smoked, ever. Does that mean that we should use every possible action to prevent their smoking? If so, we'd better get those cameras into everybody's house with all possible haste. After all, dollars are at stake. How could any claim to a "right of privacy" possibly override that?

My only fear in suggesting all this is that some people can't recognize irony when it comes up and bites them. So to remove any possible doubt about what stand *I'm* taking, I'll let Benjamin Franklin speak for me: "They that can give up essential liberty to obtain a little temporary safety deserve neither liberty nor safety."

Ol' Ben was a pretty smart cookie, and I don't think he was kidding. Tech-

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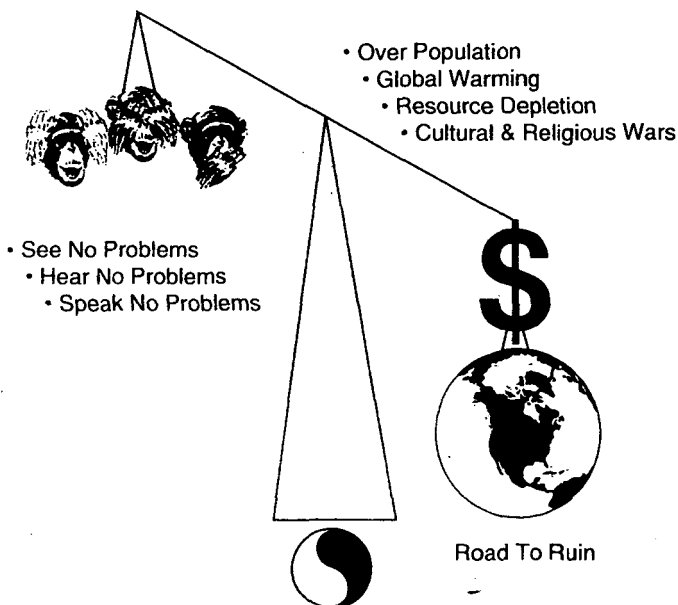
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nology now available makes it possible to do far more than anyone before us to reduce "crime" (however it might currently be defined) and any other activities that this or that group considers Not Good for Society. Quite possibly some of it really should be used, in some places and under some conditions; crime actually is a serious problem in some places. But every such use we might contem-

plate needs to be weighed very, very carefully.

Above all, we dare not fall into the trap of being so panicky about crime, or high insurance premiums, or any other bugaboo, that we accept literally and unquestioningly the simplistic axiom that "Anything that will reduce it is good." Things are seldom that simple, and sometimes the cure really *is* worse than the disease. □

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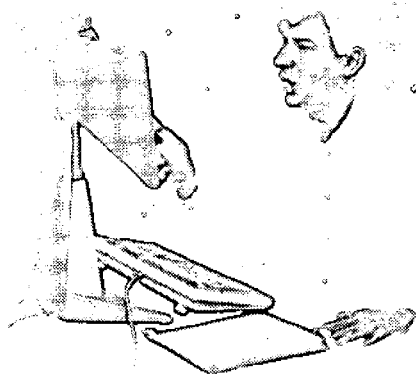
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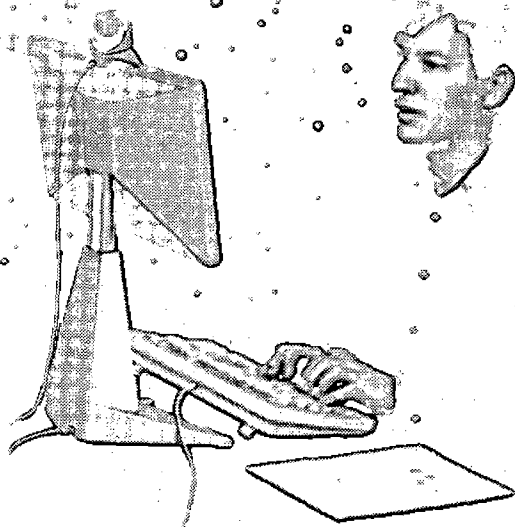


Michael A. Burstein

REALITY CHECK

*Most of us need one from time to time—
but what if there's more than one reality?*

Illustration by Randy Asplund



Life wasn't exciting, perhaps, but for the moment it was very secure, and David Strock preferred it that way. He stood up at his desk and stretched, enjoying the comfort of the late morning sunlight coming through the window of his spacious office. He looked around, taking in once more the size of the room, the beautiful chairs, the overflowing bookcases, and the view of Boston outside. Not bad for someone not even in his thirties yet.

He sat down again and hummed to himself as he shuffled the papers on his desk. This one, another paper for peer review. That one, a proposal he was writing with his experimental colleagues. *Really*, he thought, *at some point I need to get back to doing real physics*. It had been at least a week since he had grappled with a problem.

Just as the clock read noon, there was an expected knock on at the door. "Come in!"

The door opened, and in walked Judith Pell. David smiled as she carefully closed the door behind her, but left it slightly ajar. "Hello, David. What do we have today?"

David got up and began walking over to the small refrigerator he kept in his office, with a microwave oven on the shelf above. Since Judith and he were the only ones nearby who kept kosher, David tended to bring lunch for both of them every day. But their schedules meant that they usually only ate together on Mondays and Wednesdays. "Sanbusaks. From Zaatar's Oven."

"Mmm." Judith cut in front of David, opened the refrigerator door, and pulled out the white paper bag which contained their lunch. "What kind did you get me?"

"Your favorite. The mushrooms and shallots with cashkavel cheese. And an Israeli salad."

"Good, I'm starving." Judith put the sanbusaks into the microwave and turned it on. "Let's eat."

They went out to the separate bath-

rooms for the ritual washing of the hands. The men's room was slightly closer, so David waited for Judith to return before reciting the blessing over bread. They nibbled a little of the sanbusaks afterwards, to complete the ritual, but then munched away on their salads, using the plastic forks provided by the restaurant.

"Did you have a good *shabbat*?" Judith asked in between swallows of food.

"Yeah. Sarah's still tired from caring for Yitzhak, so I made dinner."

"He's what, four months old now?"

"Five months." David took another forkful of salad. "How was your *shabbat*?"

"Oh, pretty good. Seth and I stayed at home, hid under the bed." She smiled.

David nodded. "I've had weeks like that."

"So what are you working on?" Judith asked.

"Nothing much," David said, immediately followed by, "Well, this is interesting." He picked a reprint from a stack on his desk and passed it over to Judith. "Just got these today from *Physical Review Letters*. I did the work about nine months ago, but the paper just got published. Help yourself to one."

Judith put her fork down on the paper plate and read the title and author of the paper aloud. "High-Energy Consequences of the Many-Worlds Interpretation of Quantum Mechanics. By David R. Strock, Massachusetts Institute of Technology." She rolled her eyes at David. "Oh, yes, real interesting."

David smiled back. "OK, I admit, it's probably not going to shake the world outside of my field. And I know it has no applications to your work on car—carbo—"

"Carbosilane dendrimers." Judith smiled. It got a lot easier to pronounce the name of a material when you worked with it all the time.

David smiled back. "Right. Come to think of it, it has no applications at all from what I can tell. But it was fun to do."

"Fun. Well, that's why we got into science in the first place, isn't it," Judith said, more as a flat statement than a question. She put the paper back on his desk and continued eating.

"Well, yeah, fun," David murmured. He took a good, long look at his friend. "Judith, is something on your mind?"

She put her fork down and stared at her food. "I don't know. It's just that—I don't seem to be getting anywhere. Four years of grad school and my project seems no nearer to completion than it did at the beginning. Dennis is talking about lining up a job for me after I get my Ph.D., but then he has me working on stuff for his projects, not for my own. The equipment he has me working on is outmoded, and breaks down half the time, and when I point this out to him, all he tells me to do is fix it. I just feel like I'm treading water, going nowhere." She looked up at him and smiled weakly. "I'm sorry to dump on you like this."

"No, it's OK, that's why I asked." David thought for a moment. "I wish I could help. Do you want me to talk to Dennis?"

"No! I mean, better I should handle it myself. I don't want him to think I've been talking to other professors about this."

But you are, David thought, then retracted it. Judith wasn't complaining to another professor, she was confiding in a friend. "It's not like we're in the same department. I don't think he'd mind."

"I know, but still . . ." She trailed off.

David nodded. "I understand. Still, if there's anything I can do for you—"

"You'll be the first to know."

They finished eating their lunch in silence.

David got most of his paperwork finished by the middle of the afternoon, and decided to leave early. Still ruminating over what he might do to help out Judith, he sighed audibly. Physics problems were so much easier to solve than real ones. What was that quotation from his

high school physics teacher, Mr. Borten? Ah, yes. "Physics is easy. *Life* is hard."

Just as he was gathering up his papers and getting ready to go, the phone rang. David stuffed the papers into his backpack and picked up the phone.

"Hello?"

"Hello," said a woman's voice. "Is this David Strock?"

"Speaking."

"Dr. Strock, my name is Kristin Anderson. I'm a physicist working at the SSC."

The Superconducting Supercollider. David knew a few people who worked on projects there, of course, but he didn't know anyone who worked there full time. "Yes?"

The physicist on the other end of the line paused for a moment, then said, "We'd like to invite you to come down to Waxahachie. We have a position we think you might be interested in."

"Me?" David asked, puzzled. "I'm a theorist, not an experimentalist."

"We do have theoretical physicists on staff."

"But—but I'm not working on anything relevant to the SSC, as far as I know." Most of his work dealt with interactions that took place at far lower energies than that of the SSC.

"Actually, you are. Some of us here have become quite impressed with the work you're doing, and we want to meet you."

"Well, if that's all, why not come up here to Boston?"

Another pause. "Isn't there any way you can come down for—for a week or so?"

"I'm really not interested in leaving MIT. What's this all about, anyway?"

"I can't tell you over the phone."

"You can't tell me over the phone? Is this some sort of joke?"

"No, it's not a joke," she said quickly. "I'm serious. We're working on something confidential here, and we could really use your help."

David thought for a moment. "I don't have anything to do with weapons."

"Neither do we. We're not Los Alamos, we're the SSC."

"You're not Fermilab, either."

"What?"

"I said you're not Fermilab."

"I understood that, I just didn't know what you meant."

"What I meant is that I already have an affiliation with one government lab, Fermilab. And I'm content with those connections. Not to put too fine a point on it, but when I do have to go visit a lab I'd rather have to go to a large city like Chicago than a small town like Waxahachie." *Easier to find kosher food*, he thought. "I know a lot of physicists would jump at the chance to work on the SSC," he continued aloud, "but frankly, I'm not one of them."

"I think you might jump at this."

"That's your opinion, not mine. But I'm really not interested in doing any work with the SSC. I'm sorry."

David thought that might end the phone call, but Dr. Anderson was still persistent.

"Doctor Strock—trust me. This is big. And we're not asking for any sort of commitment yet. We just want you to see something that we think will interest you. That we *know* will interest you."

The sincerity in her voice finally grabbed him. All things considered, David wouldn't mind seeing the SSC anyway, at least for a quick visit. After all, it was the pinnacle of experimental apparatus in his field.

"No commitment?"

"None. Just come down and see what we have to show you."

David could live with that. "All right, look." David checked the calendar on his wall; it was Monday, and he had a class to teach tomorrow and on Thursday. But he could probably get someone to cover the second lecture. "I can fly down Wednesday, but I have to get back to Boston well before sundown on Friday."

"That shouldn't be a problem. We'll make arrangements for your tickets and call you tomorrow."

That night, David had a minor argument with his wife, Sarah. He had held off mentioning the phone call until after they had eaten dinner and Yitzhak was asleep in his crib. They sat down on the sofa and turned the television onto cable news, as usual. Then he told her that he'd be going to Texas for a few days, the day after tomorrow.

"Texas? They want you to go to Texas?"

"It's only for a few days," he said.

"What's in Texas?"

"The Superconducting Supercollider. You know, the SSC."

Sarah sighed. "David, it's bad enough that you go out to Chicago every few weeks. What's this Texas trip all about?"

"I'm not sure. They may want to offer me a job." He shrugged. "I wouldn't take it, of course."

"I hope not. We're not doing another Los Alamos."

"Hey, Los Alamos was a nice town."

"But—"

"It's OK, Sarah. I remember."

When David and Sarah had first been married, they had spent half a year in Los Alamos, New Mexico, because that had been the only place David had managed to get an appointment. He had worked for one of the theory groups at the Los Alamos National Laboratory. But the Jewish life had been practically nonexistent, with one tiny Jewish Center hidden between a copse of trees and a canyon, and expensive kosher meat only available by way of Albuquerque. David and Sarah's presence had been such a novelty in the town that the weekly newspaper, the *Los Alamos Monitor*, had done a front page article on them when they celebrated Passover.

Thank God for the appointment to MIT.

"I remember," David repeated. "I wouldn't want us to go through that again. Especially—"

"Especially now that we have Yitzhak," Sarah finished. "I'm surprised

you would even agree to go for a few days."

"I did arrange to come back in time for *shabbat*."

"That's supposed to make it better? I really don't want you going."

"You know, Sarah, I don't remember the *ketubah* I signed at our wedding prohibiting me from going to Texas."

"It's just that—David, it's already hard on me, having to stay home and take care of Yitzhak. I feel so isolated during the day. I don't want you abandoning me."

"Abandoning you? What in the world brought that on?"

"I'm afraid of losing you."

"Losing me? Losing me to what?"

Sarah sighed. "To your work. I see the look you get in your eyes sometimes, when we're at home, and you run off to write something down on another scrap of paper. Sometimes it's as if you're not completely here. What if the reason they want you at the SSC is so big that you—you never come back?"

David took his wife's hand. "Sarah, you know that you're the most important thing in the world to me."

"Am I? Sometimes I don't feel it."

"Yes, you are," David said, looking into her eyes. "What can I do to reassure you?"

"Hold me, David. And promise me that you won't take whatever they offer you."

"OK, OK, I promise."

He took her in his arms and carried her off to their bedroom. They finished the evening making quiet love.

On Wednesday afternoon, David flew into the Dallas/Forth Worth airport. He managed to get a direct flight, but the airline had screwed up his kosher meal, so when they landed he felt slightly hungry and annoyed.

Adding to his annoyance, the plane was full and David's seat was close to the back; he waited for the people in front of him to exit before he could go himself.

Fortunately, David had thought ahead and only brought an overnight bag with him, so he didn't have to wait at the carousel for his luggage. He passed quickly through the jetway corridor which connected the plane to the terminal and walked past the metal detectors. The voices of other passengers filled his ears, but the long, drawn-out sounds of their vowels definitely made this place feel different from Logan. David even stopped in surprise when he saw two men in suits actually wearing ten-gallon hats. The men greeted one of the other passengers with raucous laughter and went on their way. Amused, David smiled to himself and kept walking until he spotted his ride.

A short blond man wearing a T-shirt that displayed Maxwell's four equations of electromagnetism stood at the end of the corridor that led into the main terminal. He held up a sign with David's name on it. David walked up to him and introduced himself as other travelers jostled around them. "Hello, I'm David Strock."

The man put down the sign, gave David a warm smile, and shook his hand. "I'm Jim Bicking. I'm a technician with the SSC. Are you ready to go? Do you want to use the bathroom first?"

"I'm ready," David said. "Lead the way."

Jim led David out of the terminal to the parking lot. As soon as he left the air-conditioning of the buildings, a hot wind chafed his face. The air tasted different from that in Boston, somewhat drier. It brought back memories of the time he spent in New Mexico.

As they walked, more and more people walked around them, and the busy feeling of the airport parking lot unsettled David. His hand flew to his head at one point and he adjusted his *yarmulke*. Normally, he never gave it a second thought, but being in Texas made him feel very self-conscious about his appearance. He suspected he'd be the only Orthodox Jew in Waxahachie. The dry

heat also continued to make him feel very uncomfortable; just because he remembered it from Los Alamos didn't mean that he was used to it.

Finally, they arrived at a small white car. Bicking helped David put his bag in the trunk, and then he drove the two of them to the SSC. During the ride, the technician made small talk about life in Texas. He had his own perspective on it, as Bicking was a Caltech graduate who grew up in the Pacific Northwest. Texas felt hot and dry to him too, but he was used to the openness and the car culture. David nodded politely at his comments, but didn't really contribute much to the conversation. He kept looking out the window, taking in the suburban area he saw surrounding the roads outside the city.

In under an hour, they arrived at an administration building, in the town of Waxahachie rather than anywhere near the ring. The collider ring, of course, ran underground in an area which surrounded the town, as it was far too big to fit in the town itself. David racked his brain for the full dimensions of the collider, but couldn't remember them.

The tech parked in an adjoining lot and escorted David to the office of his contact. When the office door opened and a woman emerged, Bicking nodded a quick goodbye and trotted away.

"Dr. Strock? I'm Kristin Anderson." She extended her hand, and he shook it after barely hesitating. The laws of *negia* did say that one shouldn't touch a member of the opposite sex, but there were dispensations for politeness and other such things. But it was still ingrained enough in David to cause the hesitation.

"Please, call me David."

"And I'm Kristin. Well, I'm really Julia, but I prefer my middle name."

She smiled at him, and he smiled back. She was a small woman, with dark hair and large glasses that seemed to hide her face. She seemed to be the sort of person who would get along with anybody. Or at least try to.

He noticed that she was staring at him

with more than a usual intensity. "Is something wrong?"

"No, it's just that you look familiar, but I can't place you."

David smiled. "I have that kind of face."

"I suppose so," she said, but with a trace of uncertainty in her voice. "It doesn't really matter."

The two of them sat down, and David started in. "Well, Kristin," he said, "you've brought me all the way here from Boston to see the SSC. Can you tell me now what this is all about, or do I still have to guess?"

She clasped her hands together. "I notice that most of your work is in the field of lower energy interactions."

So she wasn't planning to get directly to the point. "That's right."

"May I ask why?"

"You know, I'm really not here for a job interview."

She unclasped her hands. "It's not an interview, I'm just curious."

David shrugged. "I find lower energies more interesting."

"Why?"

"Because the theories are actually verifiable by experiment, if you want to know the truth. A lot of my colleagues have their heads lost in the clouds, working on things like supersymmetry and string theory. It's already past the point of technological impossibility. We would need an accelerator running around the equator of the Moon to test some of their ideas." David paused. "There's also the anonymity problem."

"Anonymity?"

"Look around you," David said, sweeping his arm around. "High energy physics has gotten bigger and bigger over the years. It used to be that a group consisted of just a few scientists, all getting equal credit for the work done. Now there's no way many of our theories can be verified without huge experiments, requiring hundreds of scientists. How many co-authors did you have on your last paper? Fifty? One hundred?"

Kristin looked over his shoulder. "I'm not really sure."

"My point exactly. I don't want my name among a string of *et. als.*"

Kristin seemed to consider that for a moment. "Pardon me for saying this, but you don't seem like the kind of person who needs to get so much recognition for his work."

"Oh, I'm not an egotist. Its just that when I work on theories in lower energies, I know that they're wholly mine. And when I'm working with my experimental colleagues, I know that they can actually verify or disprove my work. If I were working in higher energies, either I'd have to arrange for time on the SSC, or else wait for an even larger collider to be built." David knew that his comments might sound confrontational, but he didn't care. "I don't see the point, frankly."

Kristin's only reaction was to smile. "Ironic, given what we brought you down here for."

Finally, an opening. "Now that you mention it, would you finally tell me what all this is about?"

Kristin nodded, and looked David directly in the eyes. "Your recent paper was brought to my attention."

"Which paper?"

Kristin opened a desk drawer, and pulled out a copy of "High-Energy Consequences of the Many-Worlds Interpretation of Quantum Mechanics." She placed it gently on the desk, facing up for David.

David looked at the paper and resisted the temptation to laugh. "*This* is what all this is about? *My parallel universe paper?*"

"It was all your own work, wasn't it?"

He leaned back. "Sure, sure it was. But it's a lark, nothing else. Completely theoretical. Just like string theory and time travel using wormholes."

Kristin gazed into the distance, then looked right into David's eyes. "Teleportation seemed like a lark when Bennett and company published their findings back in 1993."

"Yes, and as far as I'm concerned, it's still a lark, despite the experimental inroads. Its only application is quantum computing, anyway."

"We're drifting from the point."

"And that point is?"

"The point is why we brought you here. If I understood your paper correctly, you imply that when high enough energies exist, it could prove the existence of other universes."

"Other—" Didn't you hear what I just said? The paper was a throwaway piece of theory, one of those things that can't be proven. Its only significance is in theoretical cosmology."

"Are you sure?"

"Of course I'm sure! The energy levels I describe in my paper are those of the Big Bang. My theory might imply a way to test the different interpretations of quantum mechanics, perhaps see if Many-Worlds has greater validity than the rest. But that's all. And it still doesn't explain why you dragged me to Texas."

"It doesn't?"

David sighed. "No, it doesn't. My paper has nothing to do with the SSC. The only reason I could see that you would want me here is if the high energies of the SSC created a wormhole to another universe. But that's patently absurd."

Kristin removed her glasses and stared at him. The seconds passed, noted by the ticking of the wall clock.

"No," David said, finally breaking the silence. He laughed. "No, no, no! You can't possibly be serious!"

"I am," Kristin said, putting her glasses back on. "We've had a connection to another universe for about three years now."

"That's ridiculous. Why haven't I heard anything about this?"

"We *are* a government laboratory, Doctor—David. We're pretty good at keeping secrets."

"This would be one of the biggest, if it were true." A thought occurred to him. "I don't remember getting any sort of security clearance."

Kristin nodded. "It's been taken care of."

"It's been taken care of.' Do you have any idea how much a security clearance costs?"

"Yes." She let the word hang in the air, so its implications could sink in.

"Hm. I still don't believe you."

"I didn't think you would." Kristin stood up. "You want proof, right?"

"If you don't mind."

"Then let's head out to the ring."

Kristin led David to her car in the parking lot, a small gold Saturn. They got in and she began driving them to the edge of the town.

"Where are we going, exactly?"

"Building G. It's situated on the ring, about half an hour from here."

"Does the G stand for anything? Or is it just a convenient label, like the letters they give buildings at all government laboratories?"

"Or the numbered buildings at MIT?" Kristin replied.

David smiled. "Touché."

"G' stands for Gate, as in the Gate between universes. We call this division the Gate project. Over in number Two, they use the same names."

"Two?"

"Sorry. Universe Two, that's what we call it. After all, we're Universe One."

"I suppose they call themselves One and us Two," David said, a hint of sarcasm in his voice.

"No," Kristin said, apparently missing his tone. "Alpha and Beta. We're Beta."

"Um."

During the rest of the drive, David managed to make small talk with Kristin. Mostly, they talked about physics and funding, keeping the conversation on a professional level.

One thing they specifically did not talk about was parallel universes. David still couldn't believe she was serious. He kept thinking that this had to be a joke of some sort. And yet, they had paid to fly him down to Waxahachie, and Kristin seemed very serious about the

whole thing. If this was a joke, it certainly was a very expensive one.

And if it wasn't . . .

David surmised he'd find out soon enough. Might as well enjoy the ride.

Just as Kristin had said, they arrived at Building G within half an hour.

"Doesn't look like a G," David said after they got out of the car. In fact, it was a squat cubical building.

"Did you expect it to?" Kristin asked.

They entered the small cubical building through a pair of glass doors. David was hit by a blast of refreshing cool air, a nice contrast from the dry heat of the late afternoon. It was even more comfortable here than it had been in Kristin's office.

He followed Kristin down a few winding white-walled corridors, until they came to a nondescript door with a metal handle. "This is it," she said. She removed a passkey card from her purse.

"Tight security, huh?"

"Ever since—well, we try." She reached out her hand to open the door, then stopped. "Are you sure you're ready?"

"Yeah, yeah, I'm sure." David rolled his eyes, still unbelieving.

"OK, then," Kristin said. She slid her passkey through the reader and the door opened with a click.

David was hit by a blast of sound, a mix of thunder and crashing waves, which emanated from the center of the room. Its source was a giant globe of what appeared to be pure electricity, hovering at least a meter above the ground. It sparkled continuously with white and blue flashes, as if they had somehow managed to trap the fires of creation.

David had never really bothered with the Jewish blessings of witnessing and experiencing, but from somewhere in the back of his mind came the words "*Baruch atah adonoy, elohaynu melech ha'olom, she'osoh li nays bamakom bazeib*"—the blessing one said when personally experiencing a miracle. Given the

fact that David had always considered himself a rationalist scientist, in a world where he always easily managed to keep his religious beliefs separate from his scientific work, it was the last blessing David had ever thought he would say.

He recited it, with wonder and eagerness filling his soul.

Kristin shut the door, returning the hallway to blissful silence. "Well, what do you think?" she asked.

David cleared his throat. "Um. I have one question."

"Shoot."

"Where am I going to get kosher food in Waxahachie?"

Kristin smiled. "I've already done your homework. There's a Jewish community in Dallas, less than an hour away."

"Here are the problems," Kristin said once they were finally back at her office. She ticked them off on her fingers. "One, we'd like to make the Gate more stable."

"More stable. Got it." David took notes in his little black binder.

"Two, we have no idea why we're connected to this one particular universe."

David nodded. "That is odd, yes. If what we're seeing is an application of the Many-Worlds interpretation, there should be an infinite number of universes out there. With more being created every second. Say!"

"What?"

"Maybe that would explain the lack of stability. Perhaps the Gate is trying to connect to other universes. The stability may be the fluke."

"That would be a shame," Kristin replied. "Three. We'd like to be able to pass objects through the Gate without threat."

"Threat? What sort of threat?"

"Stability, mostly, and not just to the Gate. We have passed objects through before, in both directions. And we've monitored them closely."

She paused, as if waiting for David to

prompt her, so he did. "So what happens to them?"

"They disappear."

"Disappear."

"That's right."

"You mean, like—vanish?"

"Yes."

"How does that happen? I mean, what do you see?"

"I can show you a notebook log later on. But basically, the object seems fine at first, then vanishes for a short period of time. The longer it stays in our universe, the more frequently it vanishes, and the longer it vanishes, until finally, it disappears entirely, never to return."

"How long does that take?"

"A few days, usually. Smaller objects last for a week. The time is inversely proportional to the mass."

"The larger the mass, the quicker it's gone?"

"That's right."

David wrote that down in his notebook as an equation:

$$t = k/m$$

"Do you have any explanation for the disappearing?"

Kristin nodded. "We think that objects from one universe have a certain resonance with that universe. So that when they're taken out of their own universe, they try to return."

David looked into the distance, turning equations and concepts over in his mind. "That makes sense, of course. The question isn't, why do the objects disappear, but why do they hang around for so long in the first place?" He looked back at Kristin. "Do these objects ever reappear in the other universe?"

She shook her head. "Not as far as we've been able to determine."

"Then conservation of mass is being violated."

"We doubt it. We think that the mass is transforming into energy, and that the energy is being absorbed by the Gate. We still need to make more accurate measurements to verify this, though."

"And also," David added, "the law

might have to be expanded to take into account our connection to another universe. After all, our universe isn't a closed, isolated system anymore. Hmm."

"What?"

"You'd better be careful. If too much energy gets transferred between universes, and we lose the Gate, that could affect the balance of energy in our own universe. It might even have implications for the final fate of the universe."

"Cosmological implications?" Kristin asked, puzzled.

"Sure. We still don't know what the current balance in the universe is. If we let in too much energy, we might actually cause the Big Crunch. And if we lose too much energy, we might avert that by accident."

Kristin's reply was slow in coming. "I doubt our actions could have such significance."

"Are you a cosmologist?" David asked.

She shook her head. "Experimental particle physics was my only field, until the Gate happened."

David nodded. "I'm not one either, but I've studied it. Do you know how balanced our universe is between collapsing back on itself and expanding forever? It's a razor edge of difference."

"Right. Could we get back to the immediate problem?"

"Sorry. I sometimes get carried away." David checked his notes. "Stability, right?"

Kristin smiled blandly and nodded. "Right. Now, do you understand why we called you in? Your paper is the first real theoretical breakthrough we've seen in over a year. And it's not like we don't have our own people already working on it."

"I understand. That paper must have been a red flag."

"Most definitely," she replied. "So..."

"So?"

"You still haven't answered my question explicitly. Will you take the job?"

David stood up, and walked over to the window. He thought of Sarah. "Why

can't I just assist you from MIT?" he asked. "I'm a theorist. I don't need to be near the machine, I just need pen, paper, and access to a computer."

Kristin shook her head. "For one thing, we want you here so you can work in concert with all the other people studying this problem. And some of them are on the other side of the Gate."

David raised an eyebrow. "Oh."

"For another thing, all our work is classified. We can't have you playing around with our data at an unsecured facility. Any theoretical work you do on the Gate has to be done here."

David thought. He thought about Sarah, he thought about his work, he thought about the Gate. He thought about the history of science, and he thought about his place in it.

"Well?" Kristin finally asked.

David nodded. "Yes. I'll take the job."

David returned to MIT to tie up things for the semester. He was able to get a leave of absence to cover him for a few months work at the SSC, with the understanding that he'd return by the Fall. At first, the Institute had not been too pleased with David's leaving, but after a few phone calls back and forth with the SSC, they had worked it all out. A graduate student, coincidentally a friend of Judith Pell's, was put in charge of the remainder of David's classes. David was so busy getting ready to leave that he didn't really have time to check in with Judith, to find out how she was doing, so he asked the graduate student to pass on his greetings.

David's other problem was leaving behind his wife and his community for the time being.

"You promised," was the first thing Sarah said to him when he explained that he'd be gone for a few months. She held Yitzhak in her arms and nursed him as they argued in their usual, quiet manner. "You said you wouldn't take any job they offered you."

David shifted his weight back and

forth between his feet. "It's only for a few months."

"Los Alamos was only supposed to be for a few months as well. What am I going to do in Waxahachie? All my friends are here. I don't want to go to Texas."

"Well, um, I agree. It wouldn't be good to drag Yitzhak away, either. I was figuring—" David couldn't bring himself to say it.

Sarah completed his thought for him. "You were thinking I'd stay behind in Boston, weren't you?"

David shrugged. He averted his eyes from Sarah's and stared down at their baby, who suckled contentedly with his eyes closed. "Well, yes," he said. "After all, this isn't a permanent move. I'm not leaving MIT for good, just for a while."

"David, did it ever occur to you that I hardly get a chance to see you now as it is? Did you even *listen* to what I said before you left for Texas on Wednesday?"

"I listened," David said weakly.

"It certainly doesn't seem like it."

David didn't reply; he couldn't think of anything to say.

Sarah broke the silence. "So what's so important about this job, anyway? Why can't you stay here in Boston and do whatever it is they want you to do?"

David hesitated. This was the worst part. Because of security, he couldn't tell Sarah anything about the Gate project. Finally he blurted out, "Help. They need my help."

"For what?"

In his heart, David begged Sarah for forgiveness, and then gave her the standard cover story that Kristin had told him to use. "There's this new procedure that may allow them to reach even higher energies than the SSC was designed for, and they think I can help them with it."

Yitzhak finished nursing and began gurgling happily. Sarah put him over her shoulder and burped him before replying. "David, I may not be a physicist, but I'm also not stupid. This isn't the sort of work you usually do. You're a low-ener-

gy theorist, not a high-energy experimentalist."

David shrugged. "That's what it is," he said, hating himself with every word.

Sarah looked him straight in the eyes. "It's classified, isn't it? You can't tell me what you're really working on, can you?"

David nodded, feeling somewhat relieved. "No, I can't. I'm sorry."

Sarah sighed. "It's Los Alamos all over again. I just hope it's worth it to you, whatever it is."

"I hope so, too."

The lab set David up with a small apartment in Waxahachie, in a building used specifically as transitory housing for visiting scientists and technicians. He had one large room to himself with two full-sized beds, and a small kitchen which he managed to render mostly kosher. The oven needed to be cleaned up and brought to an extremely high temperature, and the microwave had to be cleaned out as well. By pure luck, the kitchen sink was stainless steel, not porcelain, so cleaning that up as well made it useable.

The apartment also came with dishes, cookware, and silverware, but David knew none of it could be trusted. He simply went out and bought cheap stuff which he figured he could abandon later. Or maybe convince the lab to put into storage for the next Orthodox Jew to work here.

David got into the rhythm of working for the Gate project. His office was in Building G, a room off the same corridor as the Gate, so he could be close to it as he worked. Every morning, before he left his apartment, he would put on his phylacteries and recite the traditional morning prayers. But now he had to get used to an additional morning ritual. After he removed his phylacteries, he would put on the purple badge they forced him to wear, showing that he had the security clearance to be in Building G. It felt odd to him. The last time he

had been required to wear a badge was when he worked at Los Alamos, and back then his badge had been red, since he'd had no security clearance at all.

The weirdest part of working on the Gate project, however, had nothing to do with the badges or the government security. The weirdest part was collaborating with scientists in another universe.

The technicians showed David how they used radio signals to communicate with their counterparts over in Universe Two. Most of the time, they simply used Morse code sent over a telegraph machine. David could leave a message for someone in Universe Two in the "radio room," next door to the room with the Gate. The message would be sent over by some technician while David was occupied elsewhere. Later on, David would stop by the room, and pick up a reply.

The technicians also showed David another way they could communicate with the other universe. They had a device similar to a videophone, which allowed for a realtime conversation between the two universes. But due to the cost, it was a method rarely used, and David never got to see it in action. He felt curious about it, but even more curious about the fact that the date and time were the same on both sides of the Gate.

For the most part, David found himself collaborating with a physicist named Harold Volin, whom he only knew through the fellow's equations. It was the most bizarre collaboration he had ever participated in, precisely because of the lack of any personal contact. Although he obviously could never meet Harold, he had a good idea of what sort of man Harold was through his jokes. Besides swapping equations back and forth, Harold would also relay mock arguments over how they could co-publish a paper and share the credit across universes.

The last part of his routine that David had to arrange was what to do every Friday night and Saturday, for *shabbat*. There were no synagogues in Waxa-

hachie, not even a Reform temple. David would spend his *shabbats* in North Dallas, which had a Chabad center on Forrest Lane, organized by the Lubavitch chassidim. David had always felt uncomfortable seeing them on street corners in their black hats and long coats, encouraging every nonobservant Jew who passed by to recite a few prayers. Now, he welcomed their presence, for they were the only people around who understood his need for religious and spiritual refreshment at the end of the week. Every Friday afternoon, a different family would take him in for the holy day, and every Saturday night he would take his leave and drive back to Waxahachie, ready for a new week of research.

But for David, the most important part of *shabbat* was that he would call Sarah every Friday, a few hours before sundown arrived in Massachusetts. *Shabbat* was a time for renewal, and his weekly phone calls to Sarah were an important part of that. Although she still sounded upset at his absence, after a few minutes of conversation she always seemed to cheer up. Which, in turn, cheered David up as well.

And so things progressed, for about a month, until a chance encounter at a group party.

David hated group parties. Even though he enjoyed interacting with the members of his scientific teams—otherwise, he wouldn't have gone into science in the first place—there was something about these parties that always struck him as artificial. They spent so much time together at work; why force them to socialize?

There was also the problem of food. People rarely took into account David's need to keep kosher, and so there was usually little or nothing he could eat. Someone had provided a bowl of carrots, so David did have something to munch on; but there were no guarantees as far as the onion dip was concerned.

David wandered around the conference room, making small talk with various other members of the Gate project. After half an hour had passed, he was already considering making his excuses when the door opened and admitted a woman he had not met before.

She was a pretty woman, with long blond hair, and she wore a red floral-pattern dress. She looked to David like a typical midwesterner. At least, David acknowledged, she looked like his image of a typical midwesterner, which was perhaps not the same thing. As he walked past her, intent on the door, he gave her a small nod, which he expected her merely to return in kind.

That made her reaction even more surprising. She stopped dead in her tracks and stared at him, which caused David to come to a stop as well. She pulled what looked like a photograph out of her purse, studied it, and walked right up to him.

"Daniel?" she asked.

"No, the name's David. Commonly mixed up, though."

"Oh. But I thought—I mean—"

"What's this?" David asked, taking the photograph from her hand. It was a picture of him, taken a few years ago, before he had grown his beard. "That's funny," he said. "I didn't realize that theoretical physicists had fans." He took a closer look at the picture, and realized that he wasn't wearing a *yarmulke* in the photograph. Nor did he recognize the background.

He looked up at the woman. "Where did you get this?"

"Um—it's a long story."

David shrugged. His curiosity was piqued, and he had to admit, he would have more fun chatting with this woman than sitting at home. "This is a party. Apparently, I have the time to hear it."

Her name was Paula Eisen, and she had the strangest connection to the Gate project of anyone David had met. She was a math teacher at the local high

school, and last year she had gotten involved in the Gate project in a rather bizarre fashion.

"His name was Jack. Jack Levinson." She cocked her head at David. "That name doesn't mean anything to you, does it?"

David shook his head. "Should it?"

"Jack would say so. You see, he came over from the other universe and I got to meet him."

David was stunned at the casual way she said that. "He crossed over?"

"Yes."

"But—but no one's supposed to do that. No one has, as far as I know, since the first encounter.

"It was somewhat irregular," she said, munching on a carrot stick. "From what I've been told, they keep it out of the briefings."

"How can they keep it out of the briefings?"

"I think Dr. Anderson doesn't want anyone else getting any weird ideas."

"That doesn't make sense. It's—oh!"

"What?"

"There is a record of a seventy-kilogram object that was sent from Universe Two into here for a few days, and then returned, apparently unharmed. That's the largest on record."

Paula nodded. "That must have been Jack."

"Um." David idly wondered for a moment what blessing one would say when passing through the Gate into another universe. None came to mind. "So what's the deal with this guy?"

"Well—there's no real easy way to say this."

"Just say it."

Paula looked around the room for a moment, at all the other people talking and eating. Finally, she looked back at David and said, "OK. Jack came over here to find you."

"Me?"

"Yes. You see, you're his best friend, and you're dead."

David shook his head quickly, then

leaned forward. "Excuse me?"

"I'm sorry, this isn't easy to explain. Your counterpart — Daniel — was Jack's best friend. Until he died."

"Counterpart?"

"Yes. The person in the other universe who is you. But he's dead."

"Dead? You're trying to tell me that there's another version of me, through the Gate, and that he's *dead*?"

Paula nodded.

David put up his hands and shook his head. "You have *got* to be kidding."

Paula glared at him, and David realized that she was most assuredly not kidding.

"Let me get this straight. This is a little too much to take at once. I have a counterpart in the other universe?"

"Had. And yes, you did. You saw the photograph."

David whistled. "This changes quite a lot. I never realized that we had—I guess 'copies' is the word—in the other universe."

"Not all of us do, apparently. But some of us—" She cut off as she noticed David staring into space. "Hello?" She waved her hand in front of his face.

"Oh, sorry. I was just trying to see how this—this symmetry, I guess, between our universes works. It might be significant."

Paula nodded. "Look, there's a lot more to this story, and I don't think this is the place to discuss it. There's an Italian restaurant I like in Dallas; would you like to go out to dinner?"

David shook his head. "I wouldn't be able to eat anything there. I keep kosher."

"Oh, right, sorry," Paula said, glancing at the top of his head. Then, softly: "Perhaps you could come over to my place, instead."

That gave David pause. He quickly glanced at his wedding ring, not for too long, but just long enough so Paula would notice it. Then he looked back up at her.

"Does this restaurant serve salad?" he asked.

The restaurant made David feel uncomfortable. It wasn't the ambience, although it did seem to be a strange mix of Texas casual and Northeast formal, what with the red plastic tablecloths and the finished wood furniture. It was just that the restaurant was not a kosher one, and David stayed out of such establishments. Even just reading the menu made him queasy, with its listings of veal parmigiana and a lasagna that clearly combined both meat and cheese. David kept looking at the door and out the large windows, worried that one of the Jews he had stayed with in Dallas would see him and think he was eating *treif*. Oddly enough, Paula also kept looking at the door, as if she expected someone else to walk in at any moment.

In the end, David only ordered a glass of water, figuring he would eat later, when he got home. Paula gave him a sad glance, but ordered a chicken parmigiana for herself.

"I hope you don't mind," she said as the waiter took their menus away, "but I'm rather hungry."

"It's fine," he said.

She nodded. "I thought you were going to have a salad."

"Changed my mind," David said abruptly. "Can we get down to business?"

"Certainly. Let me tell you about Jack."

David shook his head. "Can we start somewhere else? I'm more interested in hearing about this other version of me. It's a little disconcerting to think that there was another David Strock around."

"Daniel," she corrected. "And actually, all I know of Daniel I heard from Jack."

David nodded. "OK, so tell me the story from the beginning."

"Well, let's see. It actually begins a few years ago, before I ever got involved. You see, the first events that told the other universe of our existence were a

series of explosions in their ring. Apparently, the antimatter beams from our working SSC leaked over into the other universe, and boom!”

“I know all that.”

“Oh? Do you know that one of the explosions killed Daniel?”

David looked at his water. “No,” he said quietly. “I didn’t know that.”

“That’s how Jack got involved. Daniel and he were biking along the path of the ring when an explosion killed Daniel. Jack was there, and he saw the whole thing.” She sighed. “It really tore him up with survivor guilt. After the scientists in the other universe established contact with us, Jack got the idea into his head that he needed to find Daniel here. He wanted to talk to him, and perhaps resolve his guilt. But the scientists at the lab wouldn’t help.”

“So he took matters into his own hands.”

“Exactly. One night last year he snuck through the Gate—”

David interrupted. “How? Don’t they have any security? We do.”

“They do have security, but Jack is known to them, because of—of what happened to Daniel. They even invited him to be present the first time contact was made between our universes.” She paused. “Also, the Gate isn’t a big secret in the other universe.”

David nodded. “Pretty hard to cover up the explosions, I would imagine.”

“It wasn’t just that,” Paula said, shaking her head. “From what Jack told me, it made a lot of news when they started using their SSC. After all, it had been abandoned for quite a few years.”

“Interesting,” David said. “I’ve been thinking about the science of parallel universes, and yet there’s history to be considered as well.” He sipped his water. “How different is this other universe from ours, in that respect?”

Paula shrugged. “I don’t know. When Jack was here, we talked about it. Most of it seemed similar, except for minor things. Other than their decision to

abandon the SSC, of course. Why the sudden interest?”

David took another sip of water and looked away for a moment. “My family lost relatives in the Holocaust. It would be nice to think that the other universe missed out on it.”

“Um,” Paula said. She looked uncomfortable, David noticed as she awkwardly changed the subject back to the events of last year. “Well, Jack came to Waxahachie High School to look for Daniel or someone who might know him, and that’s how I met him. I found him near my desk in the Math department office. He seemed to know something about the school, but his knowledge was off, and—well, I was intrigued. I took him out to dinner and listened to his story. I didn’t believe him, of course, until he started to disappear.”

“Disappear? You mean, he would vanish for a short period of time?”

“Yes. I brought him back to my apartment because it was rather disconcerting. I didn’t want anyone else to notice, and besides, there was a manhunt going on.”

“For Jack?”

“For Jack. The scientists were worried that he might vanish forever, and they weren’t sure of the effect his crossing over would have on the Gate.”

“They couldn’t have told the town they were searching for a refugee from another universe,” David noted.

“Right you are,” Paula said, smiling. “They simply called him a dangerous trespasser.”

“I take it you didn’t turn him in right away.”

Paula shrugged. “I like to live dangerously. Speaking of which, after Jack vanished and reappeared a few more times, I pointed out to him how incredibly dangerous it would be for him to stay here. So I offered to help him out with his search for Daniel, since no one else would, and I helped him turn himself in to the scientists at the lab. Dr. Anderson saw him safely back through the Gate to

Universe Two, and I took on the task of finding Daniel's counterpart."

"And now, you have," David said.

Paula nodded. "And solely by a pure stroke of luck. Until today, it's been incredibly frustrating. I mean, I knew that it was possible Daniel's name was different here, but it never occurred to me it would be so close."

"What do you mean?"

"Well, apparently, I look like an old friend of Jack's in the other universe named Rachel Larsen. Our names are totally different, but we're analogues of each other. But sometimes the names are similar: the director of the SSC in the other universe is named Roy Schwitters, from what I've heard."

David nodded. "That does sound similar to our Ray Shwartz."

"Anyway," Paula continued, "I've been looking for someone named Daniel Strock or something close to that in our universe. I've also been looking for people who did the same things Daniel did, such as go to the same college or take a job teaching high school math."

"I guess that makes a certain amount of sense."

"Yeah, well until today, it didn't work. And even in this case, it seems to have simply been a bizarre coincidence."

"Unless there's a deeper connection we're both missing," David said. "Tell me, did you ever think of tackling this problem from the other point of view?"

"What do you mean?" Paula asked.

"Instead of looking for our world's Daniel Strock, did you ever search for this world's Jack Levinson?"

Paula looked stunned. She opened her mouth, as if she was about to say something, but closed it a moment later.

"I mean," David continued, smiling, "if I am this universe's Daniel Strock—my, that feels weird to say—then shouldn't one of my friends be an analogue to Jack Levinson?"

Paula shook her head. "I never thought of that."

"Neither did Jack, apparently, from

what you told me. It might have made his search easier."

The waiter arrived with Paula's dinner, and in deference to his stomach rumblings, David ordered a can of Coke. The waiter brought it with a straw, and David opened it and sipped it as Paula ate.

"You wouldn't have a picture of Jack, would you?" he asked between sips. "It might help me identify his analogue, if I know him."

Paula shook her head. "Silly, isn't it? I never thought I would need a picture of him, so I don't have one. Still—I think they must have one at the lab. They ran a picture of him on the news when they were searching for him."

"Hm. Well, maybe I'll look for it when I get back." David paused. "Now that I know all about Jack, what can you tell me about Daniel?"

"Um. Well, there's not much I can really tell. I never met him, and I really only got to know him through Jack."

"So what did Jack say about him?"

"Well, Jack tended to describe Daniel in reference to himself. Jack's a solid, steady kind of guy—"

David interrupted. "That doesn't sound like the kind of person who jumps between universes."

"Normally he wouldn't. But I think he was trying to be more like Daniel. Jack described him as more impulsive, more fun-loving. He was poking fun at Jack during their last bike ride just before the explosion."

"Hm. I take it neither of them were particularly, um, religious?" David tried to make the question sound casual, but he didn't think he succeeded.

"Not as far as I know," Paula answered. "Anyway, now that you know the story, tomorrow you should talk to Dr. Anderson, and then re-establish contact with Jack. He'll be happy to hear from you."

David frowned; Paula's use of the word "re-establish" troubled him. "Hold on a second. What makes you think I want to talk to Jack Levinson?"

"Because—well—you're the one."

David leaned back for a moment, and slowly shook his head. "I don't think you understand, really. You're accepting the same fallacy that Jack did. I'm not Daniel. I'm *David*."

Paula remained silent, and David continued. "I have a life here, my own life, that's nothing like the one Daniel led. I don't think I know anyone who closely resembles this Jack Levinson, and I certainly have nothing in common with his Daniel Strock."

"But still—for Jack—"

David sighed. "Well, look. I suppose I could relay a message through Harold."

"Who?"

"Harold Volin, my collaborator in Universe Two. He can probably look Jack up in their phone book and give him a call. Let him know I've been 'found,' so to speak."

Paula shook her head. "It's going to take a little more than that."

"Why?"

She chewed on her lower lip. "I haven't actually been in contact with Jack for almost a year now. You see, shortly after he went home, he decided to go to New York City."

It took David a moment to realize that she meant the New York City in Universe Two, not the one here.

"What's he doing there?"

"Finding himself, I think."

David nodded. He hated that expression; people who needed to "find themselves" always seemed to act as if getting "lost" in the first place wasn't their own fault, but some accident caused by the world around them.

Choosing his words carefully, he said, "It sounds as if he's forgotten about Daniel."

"Oh, I'm sure that isn't it," Paula replied easily. "I mean, he may have finally gotten his life back together, but I'm sure he'd still want to meet you."

David shook his head. "It's one thing for me to ask Harold to pass a message along to someone else in Waxahachie

Two. But it's quite another thing to ask him to track down someone who's a few thousand miles away."

Paula leaned back. "Look, David. You're not the only one who's allowed to contact the other universe. I can always ask Dr. Anderson to contact her counterpart."

"So why don't you?"

"Because if you're not planning to talk to Jack after I let him know about you, what would be the point?"

David didn't say anything, so Paula continued. "Will you at least consider it?"

David thought for a moment, and finally, he nodded. "I'll think about it. But let me point out one thing. If Jack has really gotten his life back together, do you really want to start taking it apart again?"

"I don't understand."

"How will he react when he discovers that you've found me, and that I'm nothing like his deceased friend?"

Paula looked thoughtful for a moment. "It's better to know than to be left hanging, isn't it?"

"You may be right," David said. "But sometimes, it's better not to know."

Paula had drifted away from regular contact with the Gate project once Jack had gone to New York, but now that she knew of David's existence, she insisted on being kept more in the loop. She wanted to know every scrap of progress they were making to stabilize the Gate between universes.

Unfortunately, it wasn't much. David's research simply was leading nowhere, and the Gate itself was starting to suffer signs of instability. From time to time the Gate would fade or the radio connection between universes would weaken. When that happened, they would run very carefully controlled beams through the SSC ring to restabilize the Gate, but everyone on both sides knew that there had to be a better way, and that it was only a matter of time before the Gate disappeared.

David's work was so intense during this time that Paula stopped bothering him about Jack. But in the back of his mind, David knew that that was the only reason Paula was so interested in their progress.

Summer finally came, and David left the dry heat of Waxahachie for the humidity of Boston. The first day he was back he planned to spend at home recuperating from his trip, and catching up with Sarah and Yitzhak. He made it home by the late afternoon, and opened the door calling out Sarah's name.

She emerged from the kitchen, wiping her hands on an apron. The smells emanating from that room indicated that Sarah had been making a stew. "So," she said. "You're finally back."

David dropped his bag and walked over to hug her. She accepted it perfunctorily, and without enthusiasm.

David released her, and was about to ask Sarah what the matter was when he realized that that might not be the best thing for him to do. She knew he was coming home that day; obviously, despite all the good phone conversations they had shared every week, she was still upset with him for having gone to Texas.

So instead of saying anything confrontational, he merely replied, "Yes, I'm back," as plainly as he could. When Sarah didn't respond, he followed that with, "I'm going to go upstairs to unpack my bag."

Sarah nodded. "So then what do you want to do? Are you planning to head over to MIT?"

"No," he said slowly, dragging the word out as he picked up his bag. "No, I was planning to do that tomorrow. Tonight I just wanted to stay at home and relax."

They heard crying from the other room, and Sarah immediately quick-stepped towards Yitzhak's crib. David dropped his bag and followed close behind, and when they got to the crib he peered over Sarah's shoulder at the

baby. What he saw astonished him. "My—wow! Look how big he's gotten."

Sarah took the baby in her arms and glared at David. "Did you expect me to send you pictures while you were in Texas?"

"No, but—"

"Did you think that Yitzhak would stop growing just for you? That the world around here would stop while you did your research?"

"No, no, I didn't. I just wasn't thinking, that's all."

Sarah bounced Yitzhak up and down and murmured comforting words in his ear, trying to calm him down. David remained quiet.

In a minute, Yitzhak was gurgling happily. Sarah placed him gently back into the crib, and turned to David. "So how has Yitzhak been?" he asked her.

She shrugged. "Fine, I suppose. I told you on the phone that the doctor said he was fine."

"Yes, you did," he said quietly. "Listen, Sarah. I didn't think the world here had stopped just because I was gone. I was just pleased to be back, to see how big Yitzhak has grown." He paused, then asked the question on his mind. "Sarah, aren't you glad that I'm here? I know I'm glad to see you, to be back."

Sarah stared at him, then turned around and led him away from the baby's room. David once again followed her, this time to the kitchen, where Sarah checked the pot with the stew and began stirring it with a red plastic spoon.

David remained quiet again, until finally Sarah spoke. "Yes, I'm glad," she said curtly, looking away from David and into the pot. "I'm glad you're back. But I didn't want you to be gone in the first place, remember?"

David nodded. "I'm sorry about that."

"Me too," she replied.

Sarah and he didn't talk much after that. David stayed at home, as he had planned. They ate dinner, watched the news on television, and went to sleep.

The next morning, David headed out to his office at MIT, as he knew that he would have a lot of paperwork to take care of. After last night's tension, he was relieved and pleased to note that his office in Building 6 looked exactly the same as he had left it.

Around noon, Judith Pell came to his office to join him for lunch. David hadn't really had a chance to sit down and talk with her since the whole Gate business began, which was already about three or four months now. Once again, they ate sanbusaks, and once again, Judith was distraught over her research.

"It's still not getting anywhere," Judith complained. "Half a year's gone by and I'm at a standstill."

"How is that possible?"

"I had this idea for an experiment I wanted to try, and Dennis didn't think it would lead anywhere. So instead, I'm still working on the experiment he insisted I do, and guess what? That's not leading anywhere, either."

"Hm. What was your idea?"

Judith paused, her fork halfway to her mouth. "You really want to hear about it?"

"Sure." *It might distract me from my own troubles.*

"OK." Judith proceeded to explain her work on carbosilane dendrimers, and although David tried to keep up, his thoughts drifted back to his own problems. In the back of his mind, he assimilated the information Judith was sharing, but it barely made an impact on the forefront of his consciousness.

Judith must have noticed, because she tied up her discussion quickly and then asked, "What about your work?"

"There isn't really anything I can tell you." David smiled. "You know that."

"I know, but just in general, how's it going?"

David frowned. "About as well as your work. I have ideas, but I'm not getting anywhere."

Judith nodded. "That bad. Well, maybe both our projects will work out."

That night, during dinner, David's thoughts were elsewhere. Sarah had put Yitzhak to bed early so she and David could catch up in person, but during the meal David picked at his food and spoke in one-word sentences.

Finally, Sarah said, "David, something's bothering you, and it's not me. What is it?"

David looked down at his plate. "I really can't say."

"Are you sure, David?"

He nodded. "You know I can't talk about the work."

She sighed, and leaned towards him. "David, David. Who am I going to tell?"

David looked up at her face, and saw his wife, his companion, the mother of his child, and the woman he loved. But most of all, he saw his best friend, the one person with whom he could share everything. And the one person with whom he ought to share everything.

It all came pouring out of him.

David told her everything about the Gate project, from the beginning. He glossed over the scientific details, since they weren't relevant, but told her of the frustration and the bizarreness inherent in being a part of the Gate project. Then, with only the slightest hesitation, he told her about Paula Eisen, Jack Levinson, and his analogue named Daniel in Universe Two.

And Sarah, bless her heart, believed every word of his incredible story.

When he finished, he said, "I'm sorry."

She smiled and shook her head. "There's no need to be sorry. In fact, I'm sorry, David."

"What?"

She sighed, then repeated, "I'm sorry. I know I've been acting very cold about the fact that you went off to Texas to do this project. But now I understand why it was so important to you."

"Oh."

"And there's something even more important than that, something impor-

tant to me." She leaned closer. "This conversation is what I've been hoping for, David. I've been hoping you'd share your problems with me."

David smiled weakly. "So what can I do?"

"Well, I can't exactly help you with the science, you know that." Sarah had studied English literature in college. "But I can help you with one thing."

"Tell me."

"This Jack Levinson you mentioned?"

"Yes?"

"You really ought to contact him."

David was surprised; this was the last thing he expected Sarah to say.

"I really don't think that's the issue."

"It isn't?"

"No, it isn't. It's everything. It's the research, the stupid secrecy, the pressure—"

She interrupted him. "David. I know you better than that. I noticed how much more emotional you became when you mentioned Jack Levinson. I can tell that that's what bothering you the most."

He wrung his hands. "Perhaps."

"So tell me. What is it? What bothers you about this Jack Levinson?"

David thought for a moment. "I don't want to find myself shoehorned into some artificial friendship, simply for the sake of a guy I've never met."

Sarah smiled. "Why would you have to be friends with him? Once he talks to you, he'll come to realize you're not his friend Daniel."

David tensed up.

"That's it, isn't it," Sarah said. It was a question stated as a fact.

David nodded. "I'm disturbed by this other version of me."

"Why?"

David took a moment to consider the best way to put this. "All my life I've assumed that my decisions mattered, that they counted, because I was the only me there was. But now—if it's true that there are parallel versions of us—I don't want to think that my decisions never

mattered. What happens to free will, to morality, if any and every universe possible actually comes to pass? What happens to—" He cut himself off, and it was left for Sarah to finish his thought.

"What happens to God?"

David nodded, sadly. "Yes." He gestured to their bookshelves where they kept the Judaica. He stared at the volumes of the Torah and the Talmud, the laws of his religion which he had studied as intently as he had studied the laws of science. The laws which he grew up believing and following, not just out of faith, but also out of rational deduction.

"If every possible universe can happen—does happen—then there's no reason to assume that anything we do can be for the glory of God. It's all meaningless," David concluded.

"Why is it meaningless? I never get to experience these other universes. No one does."

"But now that we have proof—"

"Some proof. Sounds to me like you only know of one other world which is different from ours, and you're having a hard enough time holding onto it as it is."

"But I know it exists. And if it exists, so do others."

"Are you sure?"

Was he? The theory the group worked with assumed that the Many-Worlds interpretation of quantum mechanics led to the alternate universe. This implied other universes, infinitely many, since every time a decision had to be made the universe would have to split into two. And if there were an infinite number of universes, then every universe had to be possible.

But what guarantee did he have that this was the correct theory? Sure, it seemed to work, but if it was correct, wouldn't they have contacted other universes by now?

"No," David said. "I guess I'm not sure."

"Then don't be so ready to jump to conclusions." Sarah came closer and

squeezed David's hand. "David, you know I can't answer those questions. I don't think anyone can answer them for you. You have to answer them for yourself. But I can tell you one thing. I know you, David. And I know that you have always acted as if these things matter. And I know that you would want to continue acting as if these things matter, even in your moments of doubt."

"You're saying I should get in contact with Jack."

Sarah nodded. "Wherever Jack is from, he's a human being in need of comfort, comfort which only you can provide. And perhaps talking with him about this Daniel person can convince you of your own individuality."

"You're too good for me, you know that?"

Sarah shrugged. "If you're going to be there anyway, you might as well do some good in the world."

David laughed. "*Tikkun olam*. Repairing the world. Or maybe that should be *olamim*? Repairing the worlds."

"Perhaps this is why you got called to Texas in the first place."

David stood up. "Sarah, I think I have a phone call to make."

She nodded.

David went to the other room, picked up the phone and dialed Paula's number in Texas. After two rings, she answered.

"Hello?"

"Hello, Paula. This is David Strock."

Pause. "I'm going to give a message to Harold for Jack."

David returned to Waxahachie the very next week. This time, Sarah was slightly more encouraging, although she insisted that he return home as quickly as possible. Just because she thought he had an important thing to do there didn't mean she wanted him gone for much longer.

Through Harold Volin, David got a message through to Jack, who indeed was living in New York. He had taken a position teaching mathematics at the

Berkeley-Carroll School, a private school in Brooklyn, but since summer vacation had started, he was free to return to Waxahachie.

Just a few days later, David found himself in the Building G radio room, awaiting a transmission on the video phone from Universe Two. Two technicians worked to boost the signal, so as to increase throughput, and Paula Eisen sat next to him, darting her head around anxiously.

"When he shows up," David told Paula, "let me do the talking."

"I'd like to say hello. I haven't spoken to him in over a year."

"Look, it's hard enough for me to just do this. Let me handle it my way, OK?"

Paula started to say something else, but then merely nodded.

After a few minutes of fiddling with the controls, one of the technicians approached David. "Dr. Strock?" she asked.

"Yes."

"He's ready for you now." She pointed at the controls. "Just flip that switch there."

David did, and was immediately face to face with someone he had never seen before, but whom he assumed had to be Jack Levinson. David studied the man's features closely. He didn't know anyone in his life who even remotely resembled him. The guy was thin and of average height, with brown hair, brown eyes, and a round face. David searched his memories of friends from high school, college, and other places, but nothing clicked.

That wasn't the case the other way around, however. After a few seconds, Jack's face lit up with obvious joy. "My God. You look just like him." Which prompted David to think: *But I'm not. Remember that.*

"Hello, Jack," Paula said. "Told you I'd find him."

David glared at her as Jack said, "That you did. Thank you."

David turned back to Jack. "So?"

"So." He leaned back and sighed. "It's

really good to see you—I mean, it's a pleasure to meet you."

It sounded to David as though Jack had been about to say that it was good to see him *again*.

"It's, um, nice to meet you too." Pause. "Paula's told me a lot about you."

"I wish I could say the same. First I've heard of your existence was a few days ago, when Dr. Volin got a message to me. I met him when Daniel—when all this began."

David nodded. "I understand."

Jack looked uncomfortable. "So, um, I hope you didn't find this too weird."

"No, not really," David said, wishing to spare Jack his real feelings. "But there are a few things I thought you needed to know." David tilted his head, making his *yarmulke* clearly visible.

"Yeah," Jack said, and chuckled. "You can relax. I know you're not really him. I can't imagine Daniel ever being a physicist. Still, I wanted to come back here, to talk to you."

"Why?" David said. He tried to make it sound like simple curiosity.

"That's a good question. I'm not really sure myself. Part of it—"

The video phone suddenly went blank. Jack's voice and face were replaced by static and snow.

"Jack?" David called out. "Jack!"

Just as suddenly, the picture was restored.

"What happened?" Jack asked. "We lost the signal for a moment there." Behind him, people were running back and forth.

"I'm not sure," David said. He turned to one of the technicians. "Why did we lose the signal?"

"I'm checking," he said. "But the video phone seems fine."

"Well, if it wasn't the phone—"

Suddenly, Kristin walked in. "David, we have a problem."

David nodded. "What's happening to the Gate?"

Kristin looked around for a moment, then said, "It's degrading. We'll probably

lose the connection within a week, unless we can figure something out."

"I see." He looked back at Jack. "Jack, would you excuse me? Perhaps you can chat with Paula for a while." He turned to Paula. "Maybe," David continued, "you could tell him about me." She nodded.

"OK," Jack said. "I understand. You need to get to work. We'll talk later."

Unless the Gate's gone, David thought. "Yeah, later."

David and Kristin worked the rest of the day and into the night, separately and together, to come up with some idea, any idea, that might work. They sent messages to Harold Volin, who was working with Dr. Anita Zahn, the head of the Gate project in Universe Two.

In the end, it was Volin who figured out an approach. He relayed the idea to David, who brought it to Kristin.

"Harold thinks we should pump lasers into the Gates at the exact same time, while slowly increasing the strength of the magnetic containment field."

"We've already tried a stronger magnetic field, and it didn't seem to have any effect."

David shook his head. "It's not the strength of the field that Harold thinks would help—it's the change in flux."

It took Kristin a moment, then she got it. "Faraday's Law."

"Exactly." Faraday's Law, developed by Michael Faraday in the nineteenth century, showed that a changing magnetic flux could induce a voltage in a wire. "Harold says that if we can induce a higher voltage directly, it may strengthen the Gate."

"And the lasers?"

"To freeze the stability in place. We're talking about cooling lasers, the kind that trap and hold atoms. Harold thinks they could trap the Gates in the same way."

"So they remain rock-steady."

"Something like that."

"Where did he come up with this idea?"

"You're not going to believe this," David said, grinning. "It looks like the Gates are simply obeying Pauli's Exclusion Principle."

"Pauli's Exclusion Principle?" This was something taught in high school chemistry, a principle that stated that two associated particles called fermions could not share the same quantum state at the same time.

"Yes. Imagine the Gate here and the one there as being two large elementary particles."

Kristin immediately objected. "But they're not elementary particles. They're—they're wormholes. They're openings in spacetime. What does that have to do with Pauli's Exclusion Principle?"

David shrugged. "I didn't say they actually were elementary particles, they just seem to be acting like it. Harold's still trying to figure out why. But he was able to establish that the Gates shouldn't ever have the exact same properties, since otherwise they'd be in the same quantum state, and then they would repel each other."

"This is purely theoretical, I take it?"

David grinned again. "Nope. It's for real. We checked the properties both when the Gates are stable and when they are unstable, and it looks like we need to freeze the Gates so their spins are opposite. That's what's been causing the instability, a spin problem."

A spin problem. The phrase echoed in David's mind. Something about spins, and being able to hold a steady spin in a particle . . . he had heard something like that recently . . .

His thoughts faded as Kristin said, "Well, unless we have a better idea?"

The thought was gone. "Nothing else comes to mind."

"We can't afford to wait any longer. Let's contact Universe Two and arrange the test for tomorrow."

The busy activity of the Gate room thrilled David, in the way that experi-

ments always thrilled him. Theory was his specialty, and he wouldn't have traded it for anything, but nothing beat the buzz of an experiment. After all, no matter how beautiful or elegant a theory was, it was never until an experiment had been performed that you absolutely knew the truth about the laws of the universe.

Even Richard Feynman, one of the greatest theorists of science, had pointed out the absolute necessity of experiment. David remembered a story a professor told him in graduate school, about a time when a bunch of theorists were arguing over the waves being produced by a fountain in a hotel lobby. Feynman overheard their conversation, and decided to answer their question by stepping into the fountain and creating the waves they were discussing.

A technician bumped into David, interrupting his reverie. "Excuse me."

"It's all right." David watched as the technicians passed back and forth, checking digital displays and making adjustments. The Gate was still active, of course; but they had managed to bring the noise down to a low hum so people could talk while readying the experiment. The air still smelled of metal and ozone, however.

On either side of the Gate stood the two Nuclear Magnetic Resonance, or NMR, machines, which would create the multi-Tesla fields necessary for stabilizing the Gate. David remembered how quickly NMR got changed to MRI, or Magnetic Resonance Imaging, by the medical profession when it became an important diagnostic tool; doctors had been afraid that patients would be frightened by the word "nuclear." Of course, there was no such nonsense here—and they weren't even going to be imaging anything, so calling it MRI made no sense.

Facing the Gate sat a powerful dye laser, which looked like a bulky metal box with a lens on one end. The other laser for the experiment sat in the other

universe, of course, and they were aligned so the beams would meet exactly in the "middle," wherever that might be.

Kristin walked in from the radio room, where she had been coordinating the final steps with the scientists in Universe Two. David turned to face her. "Are they set?" he asked.

Kristin nodded. "Yes." She pointed at the digital clock on the wall, which displayed hours, minutes, and seconds. 11:58:03 AM, Central Daylight Time. "We're synchronized perfectly."

"You know, that's still one of the mysteries of this whole thing we have yet to solve—the fact that time seems to flow the same in both universes."

"Worry about it later. Right now we've got something more important to worry about." She backed into a corner of the room. "Excuse me? Could I have everyone's attention please?"

The murmuring quieted down, and she continued. "We're almost ready to start the experiment, so could everyone who no longer needs to be here please leave the room? And everyone else, check your pockets one last time for anything metal—that field will be strong enough to rip your keys right out of your pants."

Most of the technicians shuffled out of the room; a few of them said a quick "Good luck!" to David and Kristin as they exited. Only three technicians stayed behind to monitor the equipment.

"Well," David said.

"Well," echoed Kristin.

There was nothing left to do in the last minute but wait.

The instant the clock hit 12:00:00, the NMR machines and the laser turned on simultaneously. The technicians verified this by checking the digital displays, but, of course, there was nothing else to see. Magnetic fields are invisible, and the laser light was so coherent that the only way to tell a beam existed would be to scatter dust into it.

Their combined effect, however, was

clearly evident. The Gate began churning, and what looked like spherical layers started spinning in different directions. After a few seconds, the spinning seemed to get faster.

Kristin turned to David. "This doesn't look like increased stability."

"No, it doesn't." He walked to the technician at the laser. "Can we pump more energy into the Gate?"

The technician nodded and slowly turned a dial.

Suddenly, a huge popping sound filled the room, and the Gate began to make a crackling sound. "Turn it down!" David shouted, and the technician complied.

But the Gate continued to crackle and spin, and the noise got louder and louder. Kristin jumped over to the board which controlled the magnetic field and began turning the dials frantically. "We have to turn up the magnetic field! It may stabilize the spins!" The other two technicians began to help.

It didn't work. Suddenly, the spinning spherical shells of white light fractured into white and blue sparks which sizzled and popped, and began flying around each other at faster and faster speeds. The noise in the room got even louder, prompting everyone to cover their ears.

Then, as David watched in horror, the Gate began to implode. The sphere of the Gate began to shrink, and as it got smaller and smaller, the rate of shrinking got faster and faster. The diameter was now eight meters, now four, now two, now one—

With a loud slurping sound, the Gate finally swallowed itself and was gone.

An overbearing silence filled the room, finally broken by Kristin. "David. My office. Now."

A few minutes later, David sat on the other side of Kristin's desk, waiting for her to get off the phone with the scientists in the Gate room.

"Uh-huh. I see. Thank you very much." She hung up, a dejected look on her face.

"What's the story?" David asked.

Kristin shook her head. "We can't get back the other universe. Everything we try fails." She sighed. "It's gone."

"Can't we just run more beams in the collider? That's how this whole thing got started in the first place."

Kristin glared at him. "Have you forgotten the inherent dangers? Especially now that there are people working on the other side?"

David felt sheepish. "Sorry."

She nodded her acceptance of his apology. "Anyway, building the Gate required coordinating with our counterparts in the first place. We seem to have lost all communication, not just the Gate. Without their help, all we could do would be to create more explosions along their ring."

David suddenly snapped his fingers. "Something occurs to me. They're not going to have much more to work on unless we can get back in contact. Perhaps if we just wait long enough, we can safely assume that the ring is safe again, and then we can start running the high energy beams."

"The DoE isn't willing to take that chance," Kristin said. "They've been walking on eggshells throughout the entire project." She hit her desk hard with her fist. "Damn! We've come so close."

Startled by her quick emotional outburst, David changed tactics. "Look, Harold and I have been working on theories involving magnetism and spin. But aren't there any other theories that we could use? I mean, we're not the only ones working on the problem. Isn't there any other way to reinstitute stability?"

Kristin closed her eyes and shook her head, all the while rubbing her hand. "The only other theory we had been developing dealt with wormholes and exotic matter, but—well, such a thing would be years in the future, if ever."

David nodded. He knew about exotic matter, of course—a theoretical form of matter posited by Kip Thorne and other relativists, needed to keep the throat of a wormhole open. Such a wormhole

could lead to elsewhere in our universe, or even to another universe, but the throat would close up very quickly if not held open by some superdense material. The Gate could not have been a traditional wormhole, or they never could have opened it in the first place.

There had to be another way. If only they had managed to keep the spins opposite each other for just a little bit longer.

Spins. Something, something was tugging at the back of his mind—

Carbosilane dendrimers.

So much had happened in the past few months that David hadn't really found the time to think about his friend Judith Pell, and her graduate school problems. Suddenly, he saw a solution to both of their problems.

"Excuse me, Kristin," he said, jumping up, "but I have to go make a phone call."

David practically ran to his office and dialed Judith's lab at MIT.

"Can you explain that again? Remember, I'm a math teacher, not a physicist."

"This is more chemistry than physics, actually."

Paula glared at him. She and David were sitting in his office, as he was trying to explain the breakthrough they had made. At that very moment, Judith and a team of technicians were working to implement the idea that she and David had developed together.

"OK, let me try again. My friend Judith works with carbosilane dendrimers."

"Which means nothing to me."

"All you need to know is that a dendrimer is a polymer with many branches. And each branch can have a different quantum spin."

"Which is?"

"It's a property of subatomic particles. You can think of it this way. A particle can either spin clockwise or counterclockwise. If clockwise, we call that spin down, or if counterclockwise, we call that spin up."

"Why?"

"Look at your right hand. If you make a fist with the thumb extended, the fingers curl counterclockwise, and the thumb points up. But if you turn your hand upside-down—"

"The fingers curl clockwise and my thumb points down!"

David nodded. "Exactly. Now here's the problem. We can sort of think of the Gates as having two different spins, which is why they can coexist. Our Gate is 'spinning' one way, say up, and their Gate is 'spinning' the other way, say down. But if the Gates try to spin in the same direction, they begin to lose their connectivity.

"Now, if we surround the Gates on both sides with a carbosilane dendrimer ring, and align the spins to be antiparallel by using magnetic fields in both universes, we should induce stability."

"Hm. Doesn't that require the folks in Universe Two to be doing the same thing?"

"It might," admitted Daniel. "Then again, we were leaking beams into their universe long before we built the Gate. If we can just manage to reproduce those energy levels, we may be able to use a SQUID to contact them by radio. Then we can let them know what we've discovered."

"A squid?"

"Sorry—a Superconducting Quantum Interference Device. Harold Volin used one to contact our universe, before the Gate existed. We could do the same thing."

"Oh. Well, I'm still not sure what you're talking about, but if it gets us back in contact with Jack, that's fine."

"Paula, there's one other thing." David paused. "I've hesitated to tell Kristin or the others, because it sounds so outlandish that I'm not sure I believe it myself. But I need to tell someone, so . . ."

She nodded. "What is it?"

"I've been doing some calculations, and I think I have another partial explanation for the instabilities. Once we're ready to start the Gate again, it occurs to

me that although the space axis might be invariant, that would not necessarily be true of the time axis."

"Are you using invariant to mean—"

"I mean, when we finally get the Gate to work again, we may be able to select the Gate to open up at any point in time for the other universe."

Paula was silent for a moment.

"Any point in time?" Paula finally asked.

"Yes," David said with a nod. "Any point in time. We could open up the Gate in the middle of their yesterday or their tomorrow. We could study the history of their universe, from the beginning. We could finally verify the truth of the Big Bang. We might even be able to get clues to how our universe might end, given what happens to theirs in the far future." He grinned at her. "What do you think?"

"We could save Daniel," Paula said softly.

David stopped grinning. He leaned back and didn't reply right away. When he finally spoke, the words came slowly. "I hadn't thought of that. I don't think that would be such a good idea."

"Why not?"

"Because it's already happened."

"But if the Gate allows you to travel in time—"

"It doesn't."

"But you said—"

"I said we could focus the Gate on any point of time in the other universe. I was thinking of observation, not intervention."

Paula looked puzzled. "But it's a Gate, not a window. Doesn't that mean we could open up the Gate to a time just before the explosions started, and pass through? Then we could warn Jack and Daniel not to go bicycling on that day, and save Daniel's life! Isn't that possible?"

"Theoretically, yes, but—"

"Then why not do it, God damn it!"

"Paula, you're talking about altering the timeline, irrevocably changing what has already happened, and not just for

one universe, but for two. The consequences could be disastrous."

"So?"

"Do you have any idea what the risks are?"

"Do you have any idea what it is to lose a friend?"

"Damn it, I'm losing one right now!" The anger in his voice shocked David more than it surprised Paula.

"What are you talking about?" she asked softly.

David rubbed his eyes. "It's Sarah."

"Sarah?"

"My wife. Every night, we talk on the phone. She pleads with me to come home. She hates the fact that I'm working here. She says I've been seduced—by my work." David looked away.

"I'm sorry," Paula said. "I had no idea."

"Of course you didn't," he said, a touch of sarcasm in his voice. "You don't see *me* when you look at me—you see this friend of Jack's he told you about. The bicycle-riding, impulsive, happy-go-lucky math teacher. Well, get it through your head—I'm not him!"

"I *said* I was sorry."

David wiped his eyes. "It's OK. I'm sorry too. I didn't mean to shout."

"David?"

"Hm?"

"Why can't we help Jack? I don't understand the problem."

David took a deep breath and let it out. Paula was loyal, he granted that, but sometimes her stubbornness was just too much.

He decided to explain the problem calmly and rationally.

"Look, Paula. You can figure it out for yourself. What is it you're thinking of doing?"

Paula looked puzzled for a moment. "If, as you say, the Gate can be opened up at any time in their past, we can

open it up during one of their bike rides, go through, and warn them."

"Uh-huh. Will they listen?"

"What?"

"Will they listen?" David repeated.

"From what I know, Jack is a relatively straightforward person, and Daniel was spontaneous to the point of recklessness. If a stranger magically appears in front of them to warn them off the path, will either of them really pay any attention?"

"Um." Paula bit her lower lip.

"It gets worse. If we show up before that first meeting between universes, then what happens to the Gate project? What happens to the lives of the people on both sides of the Gate? Think of the history you've lived over the past few years. You would never even get to know Jack. Are you willing to take the chance that the world we create for him—and for us—would be better?"

Paula looked away for a moment. "I'm willing to take that risk, yes."

He considered her anew. "You must really like him."

"Yes. Yes, I do."

David nodded. "But, Paula, realize that it's not just you taking the risk. It's every single human being, on both sides, who's been affected by the Gate project over the past few years. Can you honestly ask them to take that risk as well, on the chance it may bring one friend back to life?"

And what about other changes? David thought to himself. What about wiping out the plagues, the wars, the Holocaust? Do any of us have the right to do that?

The seconds went by painfully slowly. "So what happens next?" Paula finally asked.

David walked over to the window, looked out at the dry grassland that surrounded them, and then turned back to Paula. "We get back to work. And we hope they're doing the same." ■

(EDITOR'S NOTE: This story is a sequel to "Broken Symmetry" [February 1997] and "Absent Friends" [September 1998].)

STEPHEN L. GILLET, Ph.D.

DIAMOND ETHER, NANOTECHNOLOGY— AND VENUS

*"Traditional" ways of terraforming Venus
are looking harder all the time.*

● *So how about something more radical?*

No, the "ether" in the title is not the medium that, pre-Einstein, was supposed to carry electromagnetic waves. It's akin to the chemical ether, the one used years ago in operating rooms, and that still gets some use in starting recalcitrant internal combustion engines.

How so? And what does this have to do with nanotechnology? Much less *Venus*? All in good time. . . .

Terraforming Venus

Venus used to be easy to terraform; all you had to do was squirt some cyanobacteria ("blue-green algae") into the atmosphere and wait to set up the land offices. We all know the Venusian atmosphere is largely CO_2 . And it was once thought the clouds were largely water ice. So, the idea was that the cyanobacteria would photosynthesize using atmospheric CO_2 and water vapor, with the release of oxygen. When the vagaries of the air currents carried a bac-

terium into the hot lower atmosphere, it would be charred to black carbon, which would float down to the surface while the boiled-off water returned to the atmosphere. Overall, then, the cyanobacteria would split the CO_2 into carbon and free oxygen. As the CO_2 dwindled, the greenhouse effect would break down and the planet would cool. Finally, you'd end up with a cooled-off Venus under an oxygen-rich atmosphere.

Well, some folks still seem to think it's that easy. But it's not, as I've previously belabored in this magazine (*Analog*, December 1984 and November 1985).

What's wrong? Several things. For one thing, the cloud particles prove to be concentrated sulfuric acid droplets instead of H_2O ice. So the cyanobacteria will have to tolerate highly acidic solutions; indeed, they'll have to wrest the water they need out of these solutions. This isn't necessarily a show-stopper, though. A number of different bacteria,

Illustration by Shirley Chan

such as those involved in acid-mine drainage, can tolerate highly acidic solutions. So, we'd "just" need to engineer such acid tolerance into the cyanobacteria.

Even if such superbugs could extract the H_2O , though, there's too little of it. The total amount of H_2O in the Venusian atmosphere corresponds to a layer only about 10 cm thick evenly spread across the planet. That's about as much as is in *Earth's* atmosphere, without the oceans! Even if you could get some of that water to precipitate out, it would then drain out of sight into the Venusian regolith. You need a lot more water than that to be able to establish surface water and some sort of Earthlike hydrologic cycle.

But you could fix that fairly easily, at least on paper, by importing some ice-rich bodies; say a few comets from the outer Solar System. Sure, it complicates things, but we already expect to have the capability of moving small objects around the Solar System, for resource use and such. What's a few more?

The big problem—the major problem, the showstopping problem—is how much atmosphere there is. Venus has roughly 100 *kilograms* of CO_2 for every square centimeter of her surface.

That's a *lot*. To get a feel for just how much, it's worth reiterating a BOTE¹ calculation. Split completely into carbon and oxygen, that corresponds to a uniform layer 130 meters thick of carbon all over the planet, under an atmosphere of 64 atmospheres of pure oxygen. Of course, oxygen is highly reactive, and 64 atmospheres' worth is almost unimaginably so: such an atmosphere atop such a layer would last a few picoseconds before all that oxygen reacted catastrophically with all that carbon. *Boom!*

So, injecting cyanobacteria into Venus's present atmosphere would just lead to a steady state. As the carbon built

up on Venus's surface while the oxygen built up in the atmosphere, there would come a point at which the oxygen would be oxidizing the carbon on the surface as fast as new oxygen (and carbon) was being formed. I don't know what that level would be, but I suspect it would be at oxygen partial pressures of less than one atmosphere. Or, in other words, when less than 1% of the CO_2 in Venus's atmosphere is reacted.

It's *not* going to work.

There's one last problem: Venus's slow rotation. From sunrise to sunrise on Venus is about 4 Earth months, so days and nights are each 2 months long. (The sun also rises in the west, but that's hardly a problem!)

That's probably livable-with, though. Consider it a season. After all, organisms in Earth's polar regions put up with months of darkness followed by months of daylight.

Venus Reprise

So, you've gotta get rid of the atmosphere. Nearly all of it. Somehow. That's the critical issue; the water dearth and solar proximity are second-order problems we can save for later. But atmosphere removal is such a hard problem that Venus is off the terraforming radar screen just now. Mainstream terraformers (if *that* isn't an oxymoron!) have turned their attention to Mars.

The reason getting rid of the atmosphere is such a hard problem, of course, is its sheer *mass*: some 4.6×10^{20} kilograms. Mass, of course, is mass, whether gaseous or not, and if you're going to talk about removing it bodily from Venus, you're talking about a *lot* of energy: some 2.5×10^{28} joules, or about six *trillion* megatons².

One way might be just to boil off most of Venus's air with thermonuclear explosions. *Lots* of thermonuclear ex-

² But to keep things in perspective, it's only about a minute's worth of the Sun's entire output.

¹ Back of the envelope!

plosions. That's simple, all right. But most of the energy will just go into stirring up the air. *Coupling* the energy of the explosion to the atmosphere, so that a goodly chunk of the explosion's energy goes into accelerating gas to escape velocity, is tricky, to say the least.

A marginally less clumsy idea is to irradiate the Venus atmosphere with giant lasers or masers that have wavelengths tuned to the absorption bands of the carbon dioxide molecule. Just as with your home microwave oven, in this way you could (maybe) heat the CO₂ and nothing else, and so boil it away.

No one *claimed* these methods were elegant. Or cheap. But aside from their inelegance and expense, they raise serious political and social issues.

For one thing, a laser capable of boiling off major amounts of Venus's atmosphere in humanly relevant timescales would also be capable of cooking major parts of the Earth. It's hardly likely that the World Council will allow the starry-eyed entrepreneurs of the Venus Terraforming Project such a capability. In fact, any Solar System group, government or no, is likely to view such a capability askance. (And if it's a government project carried out by the Solar System as a whole, that has problems of its own.)

There's also a new issue: simple waste. The atmosphere of Venus represents the largest off-Earth inventory of carbon in the Inner System, some 1.2×10^{20} kg, or slightly more than 10^{22} moles. This is equivalent to a sphere of pure carbon nearly 500 km in diameter—about the size of the asteroid Vesta—and is likely to be roughly as much carbon as is in the entire asteroid belt. (Carbon-bearing meteorites—so-called “carbonaceous chondrites”—are thought to be typical of “primitive” asteroidal material, and have received much attention from would-be space developers as resources.)

But Venus's carbon is likely to become even more valuable in the future,

and not just because of life support. With molecular nanotechnology carbon becomes the most valuable raw material. The reason, of course, is the extreme strength of carbon-based “diamondoid” structures. SF authors and other futurists now sometimes speak of a “diamond age,” though that's a bit hyperbolic; enormously strong “buckytube” fibers, another form of carbon, may be even more important. In any event, though, blowing away such a store of carbon seems remarkably shortsighted, to say the least.

Well, then, what about mining the Venus atmosphere? Maybe terraforming will come about as a by-product of mining operations.

Unfortunately, it will probably take a while. Imagine a mining operation so vast that it removes a megatonne (a billion kilograms) of CO₂ every second. At that rate removing the entire atmosphere still takes about 15,000 years.

But we may be onto a synergy here.

Mining The Venus Atmosphere

There are many circumstances where having a fluid phase makes for convenient engineering. With adroit plumbing, you can make the material flow where you want. Unfortunately, getting a gas *off* a planet isn't one of those circumstances. It's hard enough to get solid mass off a planetary surface, as we all know. A fluid mass is much harder. Not only do you have the usual hassles of delta-V, exacerbated by atmospheric drag, but you also must deal with compressing and containing the gas. This has huge effects on expense, what with all the tankage and (probably) planetside infrastructure you have to build.

But, in the spirit of assaulting straw men, let's look at several possible methods. Catching tanks of CO₂ tossed out of the clouds, by (say) rotating tethers in low orbit, seems particularly cumbersome, if only because it implies a vast (cloud-based?) infrastructure for collecting and compressing the gas, and

launching the tanks. (You presumably make the tanks out of diamondoid extracted from the atmosphere.)

Many years ago in this magazine Poul Anderson (writing as Winston P. Sanders, *Analog*, September 1963) proposed "scoopships" for mining Jupiter's atmosphere. These would dive into Jove's air to extract hydrogen-bearing gases, for raw materials. Something similar would surely work for Venus as well, and it would eliminate that huge planet-side infrastructure. It still seems inadequate, though; imagine what an armada of scoopships you need to remove a megatonne per second!

What about a "peristaltic pump" dangling from synchronous orbit, like the one Goodloe and Oltion proposed in "Waterworld" (*Analog*, March 1994)? This would be an immensely strong hose, no doubt nanoengineered from buckytube fibers or something similar, with rings of contractile fibers along its length. The rings could contract on computer command, and by contracting in "waves" could move fluids up the hose, just as in biological peristalsis.

But Venus's slow rotation makes skystalks impractical: an orbit slow enough to match Venus's stately spin lies some 1.5 million kilometers away, probably much too far to be practical. (That's four times the Earth-Moon distance.) Maybe some vast "ultrasail" capable of sustaining more than its weight with respect to the Sun could suspend a hose at some more reasonable distance; but again, the infrastructure is getting complicated as well as large-scale.

Last, some people have proposed (evidently *without* tongue in cheek) that the thing to do is build a giant sunshade to screen the entire planet, and then let the atmosphere condense as Venus cools. Dealing with 4.6×10^{20} kg of *liquid* CO₂, however, doesn't strike me as an improvement.

How To Petrify An Atmosphere

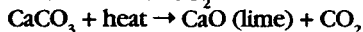
So, if we're not to divest the atmo-

sphere bodily, we need some way to solidify the CO₂. A solid form would probably also be easier to mine.

How do you petrify CO₂? The Earth shows one way. The Earth has just as much CO₂ as Venus does; maybe more, in fact. The difference is that only a tiny fraction of that CO₂ remains in our atmosphere. Some has been converted into organic matter, by photosynthesis over geologic time, and is dispersed in sedimentary rocks. (In turn, coal and oil form a tiny fraction of such sedimentary carbon.) But nearly all CO₂ has been precipitated out into carbonate rocks: limestones, which are made of calcium carbonate (CaCO₃); and dolostones, which are made of dolomite (calcium-magnesium carbonate, CaMg(CO₃)₂).

Unfortunately, removing Venus's CO₂ in this way isn't likely to be practical, at least over human timescales. First, it will take too much churning up of the crust to get enough rock for it to react with. If we assume that Venus's crust contains 5% calcium oxide by weight, then you have to react the atmosphere with *all* the calcium oxide down to a depth of about 10 kilometers. Not a trivial problem, especially since the calcium oxide isn't free for the reacting but is already tightly bound in calcium silicates.

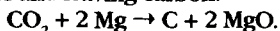
And in addition, the Venusian surface is too hot for carbonates to be stable. Too much heat cooks a carbonate back into an oxide and CO₂:



This is called the "limekiln reaction" because it's used to make lime from limestone for things like mortar and Portland cement. So even if you could put all the CaO in Venus's crust into a form that could react, the carbon dioxide won't stay reacted.

Bringing in material from outside is only marginally better. I've suggested (*Analog*, December 1989) importing magnesium or calcium metal(!) from Mercury(!), using self-replicating robots. The robots would automatically dig rock out of Mercury's crust, extract

Ca and Mg from it, and send the ingots on their way to Venus, each powered by its own little solar sail. The reason to use *metal* is that it reacts directly with CO₂, stripping off the oxygen to make the oxide and leaving carbon:



Magnesium metal even burns in carbon dioxide. Of course, when things cool a bit, the magnesium (or calcium) oxide can then react with even more CO₂ to make carbonates.

But this means we need an enormous amount of very reactive metal, which will need to be painfully extracted, at high energy costs, from ordinary Mercury rock. Of course, we dig up *lots* of Mercury in the process, too. And there are serious safety issues again, with self-replicating robots digging up major amounts of a planet and slinging the chunks across the solar system.

Elegance? You Wanted Elegance?

Well. All these ideas, whether of removal or petrification, have serious problems. The sheer *scale* of a vast, dedicated industrial infrastructure is utterly daunting.

And it's probably a show-stopper. There's an awful lot to be said for the sheer elegance of the old algae idea; just squirt something in and let it rearrange what's there already. There's no major transfer of material from elsewhere in the Solar System. Furthermore, we carry out the rearrangements molecularly, without a gigantic, single-purpose industrial infrastructure. All it takes is kazillions of tiny, self-replicating entities.

Indeed, I can't take any terraforming project seriously unless we can do it in some way like this. Quite aside from the social and military implications, at the point humanity is tossing around power enough to (say) bake off atmospheres, I expect it to be beyond terraforming. For a rough analogy: using modern construction equipment, it would be trivial to build a Stonehenge. So, a Bronze-Age European might wonder why we don't

use this capability to build lots of megalithic monuments. Sure, it would be a *heck* of a lot easier . . . but the motivation is gone.

Thus, if terraforming isn't something we can do with fairly simple technology, i.e., within the next century or so, then it probably won't happen. So, is there any way to solidify the CO₂ in situ, *without* massive importation of new material? And *without* an enormous industrial plant?

Just maybe. Let's now change the scale completely. Let's turn our attention to the molecular structure of CO₂ itself.

SiO₂ vs. CO₂

Carbon dioxide (CO₂) is a gas. Silicon dioxide (silica, SiO₂) isn't. In fact, it's a hard crystalline solid. Silica occurs in a number of forms. The most familiar is quartz, which makes up most sand as well as a good proportion of silica-rich igneous rocks such as granite. It's among the most common minerals at the surface of the Earth, in fact. A less CO₂-like substance is difficult to imagine.

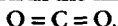
Yet C and Si are chemical cousins! They're, of course, adjacent members of Group IV of the Periodic Table. But in fact they're only superficially similar. In detail, there is a vast difference between the chemistry of carbon and silicon. (This is also why the naïve idea of Si-based life is . . . well, naïve. But that's another story.)

The differences largely stem from the difference in size of the two atoms. A carbon atom is about 50% smaller than a silicon atom. This leads to great differences in their chemical bonding, and hence in their compounds. Carbon, as a compact, first-row atom, forms tighter bonds. In particular, it can form multiple bonds, even with other carbon atoms. Since it's such a small atom, though, you can't fit many atoms around it and still keep the bonding tight, because the neighboring atoms start to "crowd" each other.

The silicon atom is bigger and so can't form multiple bonds, except fleetingly. But you *can* pack more atoms around it. It's also a bit readier to release its bonding electrons than is carbon, too, which makes silicon compounds a bit more reactive.

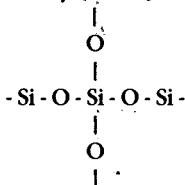
By the way, other first-row elements and their second-row cousins have similar drastic contrasts in their properties, and for similar reasons. Boron isn't much like aluminum; nitrogen isn't much like phosphorus; and despite Hal Clement's *Iceworld*, sulfur and oxygen aren't much alike, either!

C and Si are more alike than *that*, anyway. So let's look in more detail at their contrasting oxides. CO_2 consists of discrete molecules, each containing two oxygen atoms doubly bonded to the carbon in the middle:



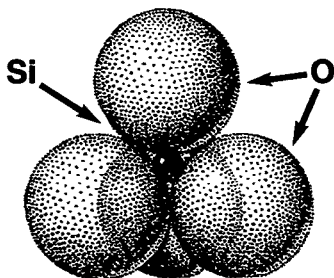
Since the attraction between individual CO_2 molecules is small, it's a gas at ordinary temperatures.

By contrast, since silicon makes double bonds only under extreme duress, a hypothetical molecular SiO_2 is not even fleetingly stable. Silica instead consists of an indefinitely extending three-dimensional (3D) framework in which each silicon is linked to four others through an intermediate oxygen atom, a so-called "disiloxyl (Si-O-Si) bridge":



Note that all the Si-O bonds are *single*. Although it doesn't show on this flat page, the four oxygens pack around the silicon atom to make a tetrahedron, the "silicate tetrahedron" (SiO_4), with the silicon atom fitting very nicely into the central hole (Figure 1). So, another way to describe the silica structure is that these SiO_4 tetrahedra share each corner oxygen to make an infinite 3D framework.

Figure 1
The SiO_4 Tetrahedron



The silicate tetrahedron. The large shaded circles are oxygen atoms; the small circle in the middle is a silicon atom. The oxygen atoms have much larger effective sizes because they are negatively charged (i.e., have extra electrons); repulsion among the electrons causes the effective size of atom to swell. By contrast, the silicon atom is small because it is positively charged (i.e., is missing electrons); the positive charge of the nucleus then shrinks the remaining electron orbits.

This is also why silica occurs in a number of different forms, or "polymorphs": the disiloxyl link is highly flexible, so the tetrahedra can link up in many different ways. The difference between quartz, cristobalite, coesite, and a host of less-familiar silica polymorphs lies merely in the arrangements by which the SiO_4 tetrahedra link up.

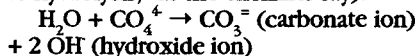
Conversely, although the C-O-C link is not especially favorable energetically, it's not especially *unfavorable*, either. It's an "ether" linkage (and now you see where the title comes from). The anesthetic ether, for example, is diethyl ether:

$\text{H}_3\text{C}_2\text{-O-C}_2\text{H}_5$,
that is, two C_2H_5 groups ("ethyl groups") held together by an oxygen atom.

Carbon also does not particularly favor the tetrahedral arrangement with oxygen. Partly the problem is size. A carbon atom does *not* fit nicely into the hole inside a tetrahedron of oxygens, but instead rattles around a bit.

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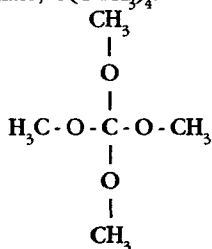
For example, the isolated orthocarbonate ion (a tetrahedron of oxygens around a carbon, CO_4^{4-} , with four extra electrons) has never been prepared, although it's been calculated to be metastable (Tossell, 1976).³ For one thing, it would react enthusiastically with water (it would be "highly unstable to hydrolysis," as the chemists say):



That CO_3^{2-} ion is the plain, old, ordinary—and very stable—carbonate ion such as you find in limestone and dolomite. And that leads to the second part of the problem: ordinary carbonate is so stable because it contains double bonds between oxygen and carbon.

In complete contrast, though, the orthosilicate ion (SiO_4^{4-}), which is simply an isolated silicate tetrahedron with four extra electrons, is trivially prepared. In fact, it's a (minor) constituent of your drinking water. It's also a structural element in many silicates. As we've seen, such tetrahedra also share corners easily ("polymerize", the chemists say), and this polymerization is basic to silicate chemistry.

Nonetheless, molecules containing a CO_4 tetrahedron *have* been prepared, even though the isolated tetrahedron is unstable. The simplest is tetramethyl orthocarbonate, $\text{C}(\text{OCH}_3)_4$:



Just as in the SiO_4 group, the oxygens surround the central C atom in a tetrahedral configuration, although it doesn't

show on the flat page. And you can buy this compound by the kilogram from your local chemical supply house. (For historical reasons, this compound is called an "ester" rather than an ether, but it still has C-O-C bonds.)

What about, then, a CO_2 analog of silica? It seems less farfetched than an SiO_2 analog of gaseous CO_2 , because carbon is far more ready to make C-O-C links than is Si to make Si=O double bonds. In fact, it's not so much that the ether link is weak. It's just that the C=O double bond is so *strong*. A group of scientists has even calculated that a silica-like form of CO_2 should be metastable (Gibbs, et al., 1988), and has suggested that making it would be an interesting synthetic goal. So far as I know, though, no one's tried.

For a specific example, let's consider the diamond structure. In diamond every carbon is linked to four others in a tetrahedral arrangement. Now suppose we replace every C-C link by C-O-C. We then get a structure analogous to a silica structure, but with all the silicon atoms replaced by carbon. In fact, this hypothetical substance (which I'll call "diamond ether") has the same structure as the silica polymorph cristobalite.

A more general name for this hypothetical carbon oxide is "carba," on analogy of "silica" from "silicon." Although it's ugly, it's short, so I'll use it, too. It's also more general because it suggests that the solid need not be related to the diamond structure, just as "silica" occurs in a number of different forms.

And presumably carba *is* a solid, too. But how (meta) stable *is* it? Does it blow up back into ordinary CO_2 if you (say) drop it? How much do you have to heat it for it to break down? Does it fizz back into gaseous CO_2 if contacted by (say) water vapor? It's of pretty academic relevance if it can be synthesized but then needs to be handled with kid gloves.

To put it in the language of chemistry, to be useful carba must have "high activation energy" for decomposition; that

³ Surprisingly, the analogous orthonitrate (NO_4^{3-}) has been prepared (Jansen, 1979), although it's also highly reactive with water.

is, the barriers to rearranging the atoms must have high energy. This is common, actually. Diamond, for example, is also metastable at ordinary pressures and temperatures. At room temperature, it ought to pop apart into graphite (the stable form) with the release of energy. This doesn't happen, though, because the carbon-carbon bonds need to break first, before they can rearrange—and that takes a *lot* of energy. You have to heat diamond up to hundreds of degrees Celsius before it begins to turn into graphite at any substantial rate.

So what about carba? Well, we can't tell until it's actually synthesized. Calculating reaction barriers with any accuracy is still way beyond the computational state of the art. But there are reasons to hope that the barriers are fairly high, and not just by analogy with diamond. Polycarbonate plastics are infinite chain structures that include lots of C-O-C links, and they don't react with water. In fact, they're tough, rigid plastics that can be used in place of glass.

So, now all (!) we have to do is convert Venus's atmosphere to carba. (And then hope that the reaction of carba back to CO₂ is still painfully slow even at the 400°C or so of the Venusian surface!)

And (Finally) Nanotechnology

Remember Ice IX, in Vonnegut's novel *Cat's Cradle*? This was a polymorph of water more stable than any known. On contacting Ice IX, all water changed spontaneously into it.

Well, that's hardly going to happen here. Even if "carba" is metastable enough, converting Venus's atmosphere into diamond ether remains an engineering challenge. We can hardly expect ordinary CO₂ to spontaneously convert on being exposed to the carba form! It's going to take a significant energy input. And, if we have to establish a major industrial infrastructure in the Venusian clouds, that's not going to be much of an improvement, in terms of expense and

time, over giant lasers or celestial vacuum cleaners or other megatechnology.

But this is (as you've guessed) where the nanotechnology comes in. Let's think about possible molecular mechanisms for converting gaseous CO₂ to carba, molecule by molecule.

First of all, photosynthetic organisms *already* have molecular mechanisms for binding individual CO₂ molecules. That's how photosynthesis starts. But then, instead of breaking the CO₂ apart completely, we'll just want to rearrange its bonding.

In fact, a number of single-celled organisms also make shells out of silica. So one approach would be to endow an organism with a set of molecular mechanisms that diverts some of its CO₂ intake into making a carba shell instead. Presumably in another half century or so, both molecular nanotechnology and biotechnology will be to the point that we can design such a molecular system and patch it in to a photosynthetic organism.

Now, when an organism is carried down into the searing lower atmosphere, it is baked into carba as well as carbon, and a carba layer starts to be deposited on the Venusian surface.

Another nice feature is that carba shells are likely to be white, from light scattered off them. So the drifting clouds of carba-shelled dust motes in Venus's upper atmosphere will help keep the planet highly reflective as it's being terraformed. Venus's clouds currently reflect some 70% of the incident solar radiation, so replacing them with something equally shiny will make terraforming *considerably* easier.

How much carba will we get? If we assume it has a density⁴ of 2.2 grams per

⁴ I estimated this density by substituting carbon for silicon into the quartz structure, and then boosting the result by 10%. This accounts roughly for the oxygens' packing more tightly around the smaller carbon atom.

cubic centimeter, then Venus's atmosphere corresponds to a carba layer about 460 meters thick evenly spread around the planet. That's about 1500 feet—hardly a trivial amount.

Of course, the carba on the surface will be breaking down back into ordinary CO₂ (very slowly, we hope!). So, presumably even after terraforming is complete, a "carba ecosystem" will be necessary to keep the CO₂ from all returning to the atmosphere—at least until most of it has been shipped off-world.

For carba will also be a considerably easier form for handling Venus's bounty of carbon. Now maybe we can think of

those rotating tethers in orbit around Venus, receiving packages of solid carba from the surface, raw material for the active industrial zones around the Sun. And now we know what the Venus economy will be based on, too—

Mars vs. Venus

Mars, of course, has completely the opposite problem from Venus: we need a *big* greenhouse effect there, and probably a large part of it will be sustained with CO₂.

So the last thing Mars terraformers will want is contamination by carba bugs from Venus! Surely there's a story or two in there . . . ■

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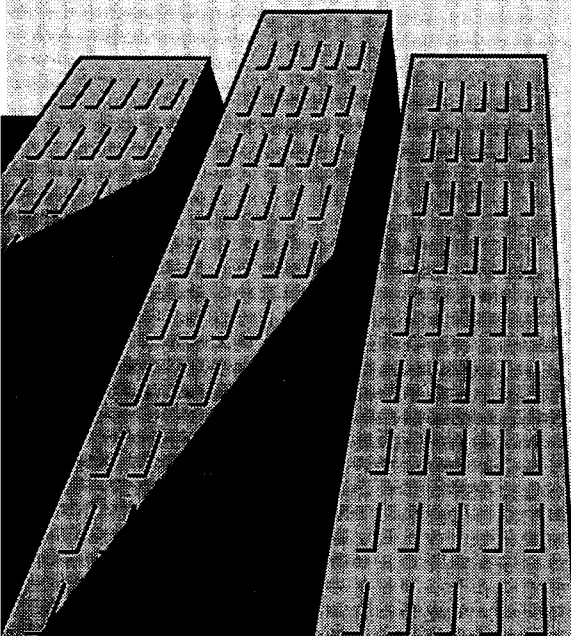
Coming Soon

(and once in a lifetime)

It's not every magazine that can celebrate a seventieth anniversary, and not every lifetime that can celebrate a new millennium (or at least a new first digit). *Analog* will do both in January 2000, and to celebrate we're planning a special oversized issue. 192 pages instead of the usual 144, filled with memorable stories and art by favorite contributors from the whole history of *Astounding/Analog*. A Kelly Freas cover for a new Mesklin novella by Hal Clement; a *tour de force* of life beyond the "Singularity" by David Brin; a personal memoir by Jack Williamson, perhaps the only writer to work with the magazine in every decade of its existence; plus stories, articles, and special features by such writers as Larry Niven, Ben Bova, Mike Resnick, and Michael A. Burstein. Be sure to watch for it in your mailbox or at your newsstand!

Pete D. Manison

PSYSCRAPER



*To control a big, complicated system, what could be better than a human mind? But if you try it, be sure to consider **all** its characteristics. . . .*

Two thousand pairs of mirrored sunglasses looked down on Kirby Cross as he stood on the sidewalk across the street, and tried to talk himself into not running away. It was his creation, that hundred-story devil, and they wouldn't have called him if they'd had any choice.

"Get out of the way, you idiot."

Someone bumped him.

"Sorry."

Abruptly, Kirby realized he'd been standing there, an island in the pedestrian stream, for several minutes. He stepped back into the tall grass and looked around him. Here, the gentle slopes of the park he'd taken such care not to disturb in either the design or the construction phases of the project. Dusk was approaching, and the smart-lights

were beginning to flicker on in parts of the park where people strolled, or sat talking, or played with their children. Across the street, next door to his creation, a newer structure loomed, its shadow long with the setting sun. Another smart-building, seventy floors or better. He'd been out of the loop too long to know who the architect was or what kind of mind controlled the goings-on within its walls.

You're drifting, a voice said in his headphones. Lissa. Kirby touched the AI-pack in his left breast pocket, thought of the real Lissa back in Utah. He wondered if she'd be painting tonight. If only he could have stayed, they both would have worked through the night. Or maybe not worked.

Now only her mindprint gave him

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comfort. He hadn't been so far from her since the breakdown.

"Yeah," he sighed. "I guess I can't put this off any longer."

Think of the hostages, she said.

And he did.

And he stepped off the grass and back onto the sidewalk.

And approached the police cordon that was keeping the pedestrians away from his tall, slender child. His sick, unhappy child.

"Hold it there, buddy. You'll have to go around."

Of course. The cop saw his shorts, his floral print shirt complete with paint stains, and his long hair. He'd almost forgotten how much he had changed.

"I'm Cross," he told the cop. "Kirby Cross."

The cop blinked, perhaps accessing an AI, perhaps just remembering a briefing. "The architect?"

Kirby nodded.

The cop called up a hologram (so it was an AI), and Kirby saw himself floating in the air. Short, conservative haircut. Three-piece suit and tie. Serious expression tinged with something only he would recognize. This was him before the breakdown. He could see Catherine in the haunted hologram eyes, Catherine pushing him on when he shouldn't have been pushed, Catherine thinking only of herself.

"You got any ID?" the cop asked.

Kirby shook his head, loathing how people judged by appearances. "Look," he said. "It's me. I don't really want to be here, but I am. Just check the voiceprint. Hurry, because I just might blow this whole thing off."

"Right, right. Don't get smart with me. OK? I have orders to—"

The words *VOICEPRINT CONFIRMED* appeared in the hologram.

After that, they had no choice but to let him pass.

The police had set up a mobile command post in the street directly in front

of the building's main lobby. Strobing red and blue lights washed the pavement as Kirby approached, and again he felt the urge to run. This was all part of a life he'd left behind, a life that had almost destroyed him. And this looming monstrosity had been his final project before. . . .

"You Cross?"

The man had emerged from one of the linked vehicles of the command post and stood, square-shouldered and giant, blocking the path. Kirby swallowed, tried to make the fear of appearing a coward greater than the fear of going through with this.

"That's me," he said. "Having a bit of trouble, are we?"

The man was a blocky shadow of disapproval. "You long-haired types really piss me off. God knows why the chief thought you'd be any help."

"Pleased to meet you, too, I'm sure."

The shadow remained motionless for a beat but finally seemed to soften as it turned.

"I'm Captain Forbes. I'm in charge of the rescue operation. You been briefed?"

"Minimally."

"Then come with me. We don't have much time."

Kirby followed Forbes up the steps and into the vehicle. On the outside it looked a lot like an RV. On the inside it was more like the Mission Control Center at NASA. Computer screens flickered along every wall, their operators staring intently into them. Most of the screens showed his building from different vantages: the rooftop of the building next door, the park across the street, a helicopter hovering high overhead. Other monitors displayed blueprints that remained, even after three years, all too familiar.

"Gentlemen, this is the architect. Cross, meet Sanders and Garza, my top lieutenants. They've been . . . less than successful."

Kirby shook hands with the two men

and gave silent thanks that he wasn't in their shoes. Forbes didn't strike him as a kindly boss.

"What's with the headphones?" one of them asked.

Kirby sat without invitation. "Hearing impairment," he lied, glancing down and then back up. All these uniforms intimidated him, but he'd be damned if he was going to show it. "So, fill me in."

Forbes frowned. "Frankly, Cross, you aren't what I expected. I don't see how—"

"I designed the damn thing! Will you get past the hair and the clothes and get on with it before we have eighteen corpses on our hands?"

Where did that come from? Lissa asked.

Forbes glowered at him, but after several seconds his shoulders relaxed a little. "So you've been informed of at least the basics. Your smart-building has taken eighteen hostages. It's holding them on the ninety-ninth floor, which it has sealed off from all contact. It has refused entry to everyone who's tried to get in, and when we tried to send a SWAT team in to do an extraction, it . . . well, see for yourself."

Forbes turned to one of the consoles and put his hand on the operator's shoulder. The operator immediately moved aside. The sound of Forbes's fingers on the keyboard was followed by a video image of five men dressed in black and carrying rifles. The men rappelled down from the roof to windows on the top floor. Working quickly and silently, they cut a circular opening in one window and proceeded to enter, one by one.

Then the confusion began. Things were moving in the darkness. Head-mounted cameras turned this way and that, trying to track the motion. Once, Kirby caught sight of something square and metallic moving toward one of the men.

Shouts.

A weapon discharging.

Then more movement, more square shadows racing along at the edge of perception. Someone cried out in pain. Confused orders and reports jammed the audio link. Finally, the voice of Forbes cut through the chaos.

"Pull back! Pull back!"

A circle of blue sky filled the monitor. It got bigger, bigger still. Abruptly, the recording ended.

"We got our people out alive," Forbes said, turning from the monitor to face him. "Any idea what attacked them?"

Kirby did have an idea, but he kept it to himself.

"After that the building's AI contacted us and told us it had shut off airflow to the floor where it was keeping the hostages. That gave them, to the best of our calculations, eight hours of air. Three now. It still hasn't let us speak to them, so for all we know they're already dead."

"No," Kirby whispered. "I can't believe that."

"Look, Cross, we need help here. Any idea why this is happening?"

Kirby thought of the breakdown, the way the world had suddenly seemed to turn on him. He'd done and said some crazy things on the way down, and it had taken him three years to climb out of it. Three years and Lissa.

"I'm not sure," he lied.

"But it's *your* mindprint, goddammit! If you can't figure it out, who can?"

Forbes, red-faced, was leaning toward him so close Kirby could smell the garlic on his breath.

"The smart-building is like a living organism," he said quietly. "Its brain controls doors and windows, communications networks, temperature, light, elevators, everything. Think of the air conditioning as its respiratory system, the wiring as its nervous system, the plumbing as its circulatory system. It has autonomic functions, and it has consciousness. Three years have passed since its AI was activated. It's grown and changed, evolved, but I

won't know how much until I've talked to it."

Forbes had listened silently. Now, his eyes never leaving Kirby's, he nodded almost imperceptibly. "Then we're in luck," he said. "It's been asking to speak with you."

Kirby felt a chill pass through him. He clenched his teeth and put it down. "Fine. Then put me on. Let me talk with it now."

A faint trace of a smile might have passed over Forbes's face, might not have. "Afraid it's not so simple. Your building broke communication with us an hour ago. It severed the cable links, and it's jamming radio. It said it won't talk to anyone but you."

"Then how . . ."

"It wants you up close and personal. It wants you inside."

The lobby doors stood, imposing glass monoliths. They had refused to open for anyone in five hours. Now, as Kirby Cross topped the sixteen steps and moved forward, the doors opened long before he reached them. He continued, his stride unbroken. When he crossed the threshold into darkness it felt exactly as he imagined being swallowed whole by a giant might feel. Then the doors closed behind him with a force that almost broke the glass.

"All hope abandon, ye who enter here!"

"Lissa! Not funny."

Sorry.

In his headphones, her voice was crisp and bright, like it was in real life. Despite his general dislike of AI, the Lissa mindprint carried enough of her soul that he found himself loving the sound of that voice as much as he loved the sound of the flesh-and-blood Lissa's.

"Can you access the blueprints?" Kirby asked.

"Blueprint," she answered. *Now there's an interesting word. It's been*

two decades since the last architect rendered a work on cyanide-coated paper.

"Lissa, I'm trying to be patient with you."

You mean I'm trying your patience.

"Why are you so much like the real one?"

He'd blurted it out before he thought, and the long silence that followed gave him plenty of time to get his bearings and head into the lobby toward the reception desk.

We're both too damned sensitive for our own good.

"Yeah. Same as always, I guess. Sorry."

I love you.

"I lo—"

This was the mindprint, he reminded himself. Not the real Lissa.

It's OK. I understand. Don't agonize over it, Kirby. My processor lets me think faster, if I have to.

"Which means?"

I can get over it a lot quicker.

He laughed. "Good for you. Then how about answering my question sometime this century."

All right already. Yes, I'm sharing space with about ten gigabytes of 'blueprints.' Which, I might add, is taking up resources that I—

"Lissa?"

Yes, Kirby?

"Shut up."

She sulked again, but at least he didn't have to turn her off to get the quiet he needed to concentrate. That would really hurt her feelings.

The main lobby included most of the first floor. The whole building was dark, and the only light Kirby had to see by came from the mobile command post. They'd positioned a searchlight to illuminate the way for him. Once he left the first floor, though, he would have to find his way in darkness.

And he'd have to go all the way to the top.

"Hello?" he called. The intercoms and audiovisual monitors would likely still be active, even without the lights. And

maybe, *maybe*, it would be as simple as that.

"Hello? Are you there?"

Maybe they could just talk it over, find out what the trouble was, come to some arrangement.

"I know you can hear me. Stop playing games and say something."

Silence. The building refused to answer. Kirby tried to see himself as his creation saw him: a hundred different inputs on video, infrared; audio of breathing, heartbeat; even pressure and temperature variations in the rooms he occupied. The AI would have all this and more. What thoughts, what plans raced through its mind?

A whisper of sound off to his right. Far across the lobby, a door had opened, beckoning him forward. An invitation.

Kirby frowned. That was a service entrance. It led to storage and receiving areas where things would be cramped, confined, confusing in the darkness.

No. This was his own mind, however changed, and Kirby knew better than to take such obvious bait. Instead, he strode directly across the lobby toward the main elevator. As he moved, he tried to remember how it had been, how *he* had been. So repressed, so driven, so single-minded. It was bound to snap. No human being could sustain that pace forever.

Catherine.

She had known he needed a break, needed to back off and regroup. And she'd never, even for an instant, let up on him. Clothes, jewelry, cars. Her appetite was insatiable, her manipulations too subtly compelling to resist.

He'd taken the mindprint at the very height of it all.

"Damn," Kirby whispered, loudly enough for the microphones, when he reached the elevator and it didn't open. He hadn't expected it to, but if the AI thought him that naïve, maybe it would underestimate him later.

"Lissa, feed me specs. And keep it visual."

She complied at once, and in the

hologram field she projected in front of him, Kirby saw what he'd hoped for: the auxiliary elevator control station was covered by only one camera.

You're not—

"Shhh!"

Be careful.

And he was. Following the blueprint, Kirby made his way around the shaft to the cluster of small rooms that were screened from the lobby by foliage and a small fountain. In the darkness, he had little trouble coming up behind the moving camera and seizing it. After he was finished, it sagged in its cradle like a sentry's broken neck.

Then, before the AI could anticipate his plan, Kirby sprinted into the first of the small rooms and activated the manual control terminal. The program booted up, but when he tried to open the main elevator nothing happened.

He moved the cursor, clicked on RESET.

Nothing.

He tried again.

A red message appeared in the middle of the screen: *CONTROL COMPUTER HAS LOST CONTACT WITH ELEVATOR.*

Kirby looked down. The manual breakers had been thrown! Now who would . . .

Light and fire and pain in his hand. When he touched the circuit-breaker, the jolt of electricity knocked him off his chair and onto the floor.

"Damn," he breathed. This time he wasn't playing to the mike.

He checked his watch. One hundred and forty more minutes before the hostages ran out of air.

Lungs, twin air processors in the highest place. Air bringing life where drawn and directed, denying it where not. Within the vast, constructed body, thousands of nodes, branches, divisions until at last each cell, each room or corridor was nourished.

Or not.

Kirby Cross moved on hands and

knees through a ventilation conduit that led from the lobby to the central air-core. It was dark and cold, but the strengthening air current gave a sense of life to the interconnecting tunnels. Some, returning used air to the core, tasted damp and carried a thousand messages of life in scents recognizable and not. Others, blasting outward toward the lobby, carried fresh, processed air—air drawn in and sanitized and modified as to temperature and humidity.

Kirby crossed through a node, manually opening and then closing the air-tight seals and entering a section of conduit where the air had gone so stale it was almost unbreatheable. Here, waste gases were being allowed to accumulate. For what purpose?

And then, thankfully, into the next, where returning airflow gently directed him toward the air-core. Once in the core, if countermeasures had not been dispatched, he could easily reach his goal.

It all took him back to the frenzied months of creation. He had torn himself down in the smart-building's design process, used his soul for raw materials and never taken the time to replenish his reserves before returning to give more. Caffeine and then stimmers had driven him on through sleepless nights in the virtual design net. While Catherine had slept, that smug little smile on her face, Kirby had walked the corridors, tested the elevator accessibility, altered the width of hallways and the height of steps, checked for echoes and other acoustical aberrations, worked and lived inside a structure that existed only in cyberspace. With full bodysuit and tactile sensation, it had all come to life while he slowly but steadily gave it his energy and resources and asked for nothing in return.

Catherine did the asking for him. Only she didn't ask, she demanded. And when the cracks started to appear, when his weaknesses began to gain the upper hand, she gave him no fallback

position, no way out. She wanted so much from life. The things she wanted cost money. This contract would work a major change on her shopping habits.

He could smell the expensive perfume, could see the sparkle of jewelry and the flash of clothing she wore for herself, perhaps for other men, but certainly not for him.

No, she didn't back off when the cracks appeared. She just found her way on the web, altering psych profiles and stress tests and prescription records. When they did the background check for final mindprint approval, he was relieved but surprised that he passed. The encoding of his thought patterns into the building's ROM followed. Then came Catherine's trips to Europe and her intoxicated encounters with the law, all of which took more money and added more stress.

No. Kirby caught himself at an intersection of conduits, uncertain which way to go, and he forced himself to stop the inevitable slide into the memory he always ended up reliving anyway, no matter how hard he fought it. But no, not now, not here.

"Lissa, which way?"

His voice was like the whisper of a ghost in the dark tunnels. It had been so long since he'd spoken or heard a sound.

Right, then up. You aren't far now.

One step at a time, the only light coming from glowstrips that sensed his body's heat and illuminated his way with a faint greenish light. They were part of a closed system, but it still bothered him that his position was known on some level. Following Lissa's directions, he moved quickly now. Along a curving tunnel, light cocooning him as he moved. Opening an access hatch and climbing up a ladder whose rungs were slippery with condensation. The building was storing moisture here. For what reason?

Finally, Kirby emerged into an oval room whose walls were lined with com-

puter terminals, banks of switches, mazes of valves and levers. It was only an auxiliary control center, but from here he could override the main control center and restore airflow to the hostages—manually, if necessary. There was nothing—

Kirby straightened from the console where he'd already begun to work. Something, somewhere far away. The briefest scraping of metal on metal.

There. The ninety-ninth floor, one below the top. The AI had severed the entire floor from the air-core, refusing to let waste gases circulate out or to let fresh, oxygenated air return. An organic pinching off of support to one of its extremities, like a plant denying nourishment to one leaf in order to save the rest.

Kirby reached out to effect a bypass.

His hand froze above the keyboard.

Kirby, what is it? Your heart rate . . .

Motion, out of the corner of his eye. Poised at the terminal, Kirby moved only his eyes. There, the hatch where he'd entered. The handle turning.

Instinct took charge. Kirby fell away from the console and moved behind a cluster of metal pipes. As the hatch beyond slowly opened, he sank back into the shadows and wished the life of an artist hadn't put so many pounds on him.

The hatch barely rasped against the wall, and the gleaming metallic shape eased itself silently into the room. Kirby watched, fascinated. A cleaning robot! It had been reprogrammed, apparently, for it conducted a careful search of its surroundings while moving slowly toward the opposing hatch. It stopped at the console where he'd stood and sniffed at his heat signature before turning toward the cluster of pipes and raising one of its scrubber arms.

The scrubber had been replaced by something shiny and sharp.

Damn!

It was now or never. The controls he needed were *right there!*

Kirby?

He dared not answer Lissa's voice, dared not even breathe. He could reach the other hatch in time to open it and climb through, or at least he thought he could. But even as the menacing metal form whirled and rotated, triangulating on his position, Kirby thought of the eighteen hostages, the eighteen who were as much his victims as they were those of his creation.

Kirby waited until the robot started rolling forward to dart in behind it and raise his fingers to the controls. A simple set of instructions, a simple series of key-strokes to activate the macros, and . . .

Pain! Fire sliced into his right triceps muscle, and Kirby turned automatically to grab the metal arm that was swinging what looked like a shard of broken glass.

Get out of there!

Lissa, even without visual input, knew he was in trouble.

Kirby stood there, feeling the unrelenting strength in the arm. The shard glistened in the robot's headlight, and Kirby noticed the tiny antenna on the top of the carapace. Was this the insectile mind of the robot he fought, or was the building's AI, his own alter ego, controlling it?

No time to find out. With one last longing glance at the ventilation controls, Kirby pushed away from the murderous machine and plunged through the exit hatch. Just as he closed it he heard the sound of breaking glass.

You know what you have to do, Kirby. You have to talk to him. It's you, my love, the way you were.

Lissa's AI voice in his ears was soothing, but Kirby kept moving. The cleaner would have sent out a distress signal and given the building an itch. How it would choose to scratch was what worried him.

"What does it want?" Kirby asked her. "Why is it doing this?"

Don't try to figure it out. Maybe you should give it up, my love. Just come outside and let the rest of them handle it.

ANALOG

That didn't sound like an AI; it sounded like Lissa herself. Or was there a second Lissa now—one with whom he could fall in love just as easily as the first?

"No," he said. "I have to go forward. I have to talk to it, to *him*."

Have it your way, then. Here's the schematic. The nearest system link is marked by a flashing red X.

Kirby smiled. He knew she'd hold him accountable, the same way Lissa would.

Is he like that, too? Kirby wondered. Was his own mindprint a living being he could grow to care for, to love?

The flashing red X.

Kirby turned the hologram field down to its lowest brightness setting and left it on as he moved down a wide, carpeted hallway past doors with winking palmlocks and VR intercoms. Down on the left, stop and descend. Avoid the cameras and mikes by hugging the wall and moving silently.

Arriving, at last, at the local communications node. Here, he could not hide. But here, at last, he wished to be seen.

"You."

The voice issued from the glittering walls, from all the instruments and control panels and displays. It seemed at once to envelope him and to dismiss him.

Lissa.

Think of Lissa.

"Yeah, it's me. Looks like I really screwed this one up."

Silence.

"You are brave to enter inside of me, Kirby. Or should I call you *Father*?"

"How about Master?"

"We both know that will never be. Never again."

Kirby tried to hold the thread of conversation as his mind boiled with ideas. This was an amplified version of his own mind. Not the way he was today but the way he *had* been, back in the last dark, driven days.

"So," Kirby said, "how's the weather up there?"

Laughter.

"You cannot be the one. Don't you even care that I could—"

The sound of faint machinery came and faded so quickly he almost didn't notice it.

"I care that you've endangered innocent lives. Let them go."

The node's air circulator stopped humming, which probably meant something. Kirby examined the settings on nearby units, where the node orchestrated all the communications activities of its section. There were nine hundred of these nodes—nine per floor: the building's sensory system.

Silence.

Darkness.

The node had been shut down.

Fine, Kirby thought. *Two can play that game.*

"OK," he said loudly, confident that at least a tracermike had been left active. "OK, perfect. I'm gone. Do whatever you want with the hostages. Why should I care?"

Silence. Kirby stepped away from the dead node and started walking back the way he'd come. He pried a glowstrip from the wall and used it to navigate in the blackness, and when he had to change levels he used the stairs. Twice he had to detour around electronic doors that couldn't be opened in the blackout, but after the second he found a portable power pack and was able to open them as he went.

Then he stood in the lobby, the strobing lights of the police cars stabbing in through the glass and the street-level doors.

"That's it, then," Kirby said, walking toward the doors. "Hope those wrecking balls don't hurt too much."

Ten meters. Twenty-five. He reached for the door.

Something hissed. Kirby turned to see the main elevator doors opening. Beyond, the elevator car was lit by an enticing pinkish glow.

A voice over the PA system, said, "Don't go."

Up. The speaker played standard elevator music, which made Kirby smile. Another inside joke from himself. A sign of repression recognized and mocked by dawning independence.

Humor.

"I want you to release the hostages," Kirby said, as simply as if he were speaking to another person beside him in the car.

Up. Up. One hundred floors was a long way to go.

"I know you can hear me. I know who you are. You can't hide from me behind elevator music."

Now the sounds from the speaker changed subtly, the beat growing stronger, lyrics joining chords that grew darker and more insistent.

Up.

"At least open up their air supply. You can't want to harm innocent human beings."

"Innocent?" The word leapt out of the lyrics of the song, disappeared again like a fish beneath the surface of a pond.

"OK, maybe no one's completely innocent, but you're just trying to distract me, the way I would. The point is, you're just using them. They're just a symbol to you, an idea. So, you've communicated the idea. Now let them go."

"No, no, no," sang the speaker. "No, Daddy, no, no, no."

Daddy.

Kirby felt the increasing pressure beneath his feet. The car was accelerating as it ascended—part of the routine program, though it seemed a little excessive.

"Look, you're a mirror image of my own mind, right? So just trust me as you would yourself. Give me that much: talk to me as an equal."

"The hostages are more than a symbol," a deep voice burst from the speaker, replacing the devil music. "They are my power. If I release them, I lose my power. If I make them appear too safe from harm, my power diminishes. I don't want that."

Screams. A woman in pain.

Or something he fabricated, Kirby thought. It was what he would have done.

The pressure beneath his feet was still increasing, and now Kirby felt the uncomfortable force pulling his stomach into the floor of the car.

"Listen, can you remember the matrix, where you were programmed and tested?"

A long, silent pause.

"I remember a life. You made me think it was real. You made me think *I* was real. You made me live a life and think it was real. You made it a hard life."

"Testing you, finding you worthy."

"But I wasn't, Kirby. You know that. Catherine knew that. And I know that."

"No."

Now on his knees as the force grew too powerful to fight. He'd black out if it got much worse. But at this speed he'd be running out of shaft pretty quick.

Shit!

Kirby cast about for escape. There were two exits, besides the door. But time . . .

"You thought you could come here and stop me. Now you think you can outwit me and get me to set them free. How little you know. You have not lived the eons it takes to acquire wisdom."

"And you have?"

"I'm in control here. I say whether you live or die. The roof of the shaft is double reinforced. But you know that. Do you know how far away it is? How fast it is coming?"

"Then do it!" Kirby shouted. "Kill your father, your creator, the only being in the universe who can possibly understand what you're going through. I don't care. You've pushed me past the point of caring."

The car continued—one second, two. Kirby visualized the closing distance.

Then, at first barely discernibly, it began to slow.

"I must find a way to punish you," the speaker said.

Kirby ignored the words and thought fast. Out of the car. Out. It was playing with him, the way he himself might have once played with a rival firm in a bidding war. He would have gloated, given his victim hope so that he could break it.

Slowing, stopping.

Three ways out.

Not the main door. On the schematic he was so close, three floors below the hostages. But no, an obvious trap.

Out of the car.

The main doors weren't opening anyway. The car had stopped, and the doors remained locked tight.

Out.

Two hatches, one in the floor, the other in the ceiling. A surveillance pod above the controls.

Kirby smashed the pod, using the force of both arms and cutting his right hand in the process. The pod's lights went dark, and he chose the top hatch.

"Lissa!"

Here, Kirby. The code I think you're looking for.

Seven, eight, three, seven.

The hatch opened, and Kirby moved quickly, pulling himself up and looking around. The top of the car held a small maintenance locker, and he grabbed several tools from it before instinct warned him not to linger. Moving to the edge of the car's roof, he took hold of one of the rungs on the ladder that led up one side of the shaft.

He lifted one foot for a rung.

The car dropped away beneath him, falling unchecked down the shaft and shoving him hard against the ladder. He clung to the single rung, dropping most of the tools he'd collected.

"Lissa!"

Her cartridge had slipped from his pocket and was dangling in space, held only by the headphone cord. Kirby grabbed the headphones and almost dropped them. For agonizing moments she swung there above the void, and just as, far below, the car

crashed in a burst of sparks and an explosion of smoke, Kirby tugged on the cord. The sound wave of the car's crash reached him—all screeching metal and rumbling vibration—as he got the cartridge back in his fingers and into his pocket.

Foot on a rung.

Pain from the left knee and right shoulder.

A rung in each hand.

Now which way, up or down?

"I thought I'd lost you."

It was close. You really should strap me in or something.

"I thought you'd never ask."

Lissa, speaking in his ears and giving him strength, as she always did. He'd never have made it through recovery without her. And now, in this dark cavernous place, he drew on that strength again, as real through the AI mindprint as it was from Lissa herself.

He thought of her, in the mountain cabin, painting. What work would she turn out in this troubled time? He couldn't wait to see it.

At each level of the shaft were four possible entry points, depending on how the car was oriented. Each of these points was connected to a level watchdog, which controlled the doors and monitored activity in the shaft.

Kirby smashed the watchdog, a pyramid of lenses, but this time he used his foot. His hand was still bleeding, so he tore a strip from the bottom of his shirt and wrapped the wound.

Now his foot hurt.

Up or down?

The building would feel him here as a sharp pain. But with the elevator in ruins, would it misinterpret the pain, think a debris fragment had taken out the node? The crash of the elevator had surely damaged others farther down the shaft.

Still, best to move on.

They're only three floors above you, Lissa urged through the headphones. Did you hear that woman scream?

"I heard," Kirby whispered.

They only have thirty-seven minutes of air left.

"I know."

Kirby concentrated. It thought he was dead, or probably did. Act on that assumption—it won't hold true for long.

He could climb up, enter the top floor through one of the four entry points, and manually restore the air—if necessary by cutting through the exterior windows. But once he opened the door it would know where he was and exactly what he was doing.

"No," he said softly, for the shaft had ears. "That won't work."

Lissa said nothing, but somehow her silence brought the answer. Do the unexpected. Go straight for it.

Down the shaft, evading the nodes as he could. Being bolder than his AI alter-ego could imagine.

Go straight for the brain itself.

Kirby Cross came from a family troubled by emotional abuse. His younger brother had died under mysterious circumstances, and Kirby had grown up an only child. There had always been that shadow. It haunted Kirby, and it haunted his father. The excesses began soon after, and how far they went was something he was never certain he wanted to remember, even if he could.

(Moving along a narrow service conduit connecting two levels along the interior surface of the exterior wall.)

Then, older, Kirby had drawn a kind of strength from his troubled upbringing. If he could survive *that*, he told himself, he could survive anything. A driven career man with a beautiful young wife, he rose quickly to the top of his field.

(Lissa shot him the specs, and he made a turn.)

But Catherine had been the wrong choice of brides. Scheming and eager to satisfy her many appetites, she began to drain Kirby's resources—physical, mental, emotional, and financial. All the

time, she drove him on toward bigger projects, larger commissions. Nothing was ever enough.

(Now he came to the junction of a wider corridor. He continued through it, using a large sheet of mirror-paper taken from the maintenance locker to stealth himself from a node, and continued along the service conduit. Closer, closer all the time.)

The New Golden Gate.

The QuadraArena.

Each project grander in scope, each a bigger and riskier investment. He ran on adrenaline and caffeine, then nicotine and amphetamines. At the end, he wasn't sleeping or eating at all.

(Pain in his right hand. The cut went deep, and even though it had stopped bleeding, it hurt like hell. And he kept banging his left knee into things, always in the same place. It was hot in the conduit; sweat matted his hair to his face and ran down into his eyes. He kept moving, thinking of the hostages, the lives held in the balance.)

Breakdown.

He'd been to a board meeting, the usual pressure, the usual drugs. At the meeting he'd fielded several unexpected questions, and then the VP in charge of cutbacks and downsizing had shown up unannounced. It hadn't gone well, but he'd kept control of the project.

It was Catherine who finally drove him over the edge.

(Lighting change, a faint whisper of air. He was close now—very close. Thick cables merged to form thicker ones, leading to the core. The central switching station. The brain.)

He went berserk, by all accounts, though even the deepest psych-probes could never make him remember any of it. The next thing he knew, he was in rehab, relieved of duty, and when Catherine visited it was to serve him with divorce papers. Long months of therapy followed. Suicide attempts. And then Lissa came, and she saved him.

(At last, he reached his goal. On the

other side of this wall lay the control room of the building's AI.)

Her strength, her understanding and compassion had given him a center again. She had never demanded. She had given freely of what she had.

(A voice, somewhere far away it seemed as he thought about the past.)

Kirby, snap out of it. You don't have much time. You've been motionless there for three minutes.

Kirby blinked, straightened. "I'm here. Just tuning the cutter." He withdrew the laser saw, also taken from the maintenance locker, and checked to make certain it had enough power to complete the cut.

It did.

Do it!

He did.

The metal parted to the cutter, and in six seconds he had a circular opening he could crawl through. There, nestling in enfolding walls of flashing lights and glittering readouts, his silicon self pulsed quietly all around him. He stepped through the opening he had cut, and just as he emerged on the other side there was a brief flash of light. Kirby ignored it and set to work.

Or tried to.

The first access terminal was dead. He linked into the system directly, but just as he was opening the startup menu the program threw him out.

Kirby tried again, but it threw him out a second time. Protected. He'd have to—

"Too late, Father. You have come far too late."

Around him, the readouts and panels flickered wildly as the AI drew on all its resources to confront him. Kirby darted for the exit, but as his hand touched the wall a jolt sent him flying back into the command node.

"I electrified the wall," the room said, its voice deep and eerie. "I could have killed you anytime I wanted."

Kirby thought about diving through the hole. He might be able to do it without touching the sides, though the life of

an artist had made it a tighter squeeze. But even as he considered it, he saw movement beyond the opening.

Cleaners, their blades oiled and flashing.

"When I tell them to, they will kill you."

Kirby looked for the physical source of the voice but couldn't find it.

"How did you know I wasn't in the elevator?" he asked, stalling for time. He had to think.

"I read a weight decrease half a second before I released it. That and the damaged node."

It slowly began to dawn on Kirby that he was powerless. He could do nothing. The hostages on the ninety-ninth floor would die, and there was nothing he could do to stop it.

"At least let them go," Kirby pleaded. "You have me. That's what you wanted. To get back at me."

"Petty as it sounds," said the room, "yes. And I know I can make you suffer more by killing them than by anything I might do to you. No, I'll save you for the end. Meanwhile, I've been bleeding carbon monoxide into the ninety-ninth floor. Let's have a look, shall we?"

One of the monitors blinked off, then came back on with what appeared to be a live image of the room where the hostages were being kept. One man lay on the floor, his head propped up with cushions, while two others bent over him.

"Heart condition," said the room. "Angina, I believe. Quite painful, they say. Without his medication . . ."

"Damn you! You have to stop this! There has to be something of me in you!"

"There is, Father, there is. I am only what you were. OK, I'm amplified a bit, but I am still *your* mindprint."

Kirby slumped into one of the chairs and leaned his head forward onto the console. It was over. He had failed. This thing was his past coming to make him

pay, again, for his sins. This enemy was him, but it was him squared, with resources far beyond those available to a mere human.

And yet . . .

It *was* him, from the time of the crackup. Kirby Cross, with all his needs and aversions, all his potential for good and evil.

Can I do it? Kirby wondered, washed in the lights of the consoles. *Can I save my child the same way I was saved?*

Beyond the circular hole he'd cut, cleaners fidgeted, eager for the kill. This might be his only chance. It had taken months for him to put it back together,—it'd been a slow and painful process. But this AI was thousands of times faster.

And so was the catalyst.

"Do this for me, my love," Kirby whispered. Then he took the cartridge containing Lissa from his shirt pocket and set it down on the console. He hesitated, but finally removed the headphones that linked her to him.

To his troubled child, Kirby said, "Son, there's someone I want you to meet."

They sat in the park on that October evening and looked across the street at the many glittering lights. It was getting dark, and as Lissa snuggled into his side Kirby wrapped his arms more tightly around her. Flowers and wet pine and a thousand other scents blended with the slow meandering of lovers, people walking their dogs, the gentle swaying of the grasses. Kirby felt still inside, peaceful and calm.

Yet waiting.

"Look at them," Lissa murmured.

Across the street, his magnificent child soared up as if reaching for the first stars of the night. Beside it, across a busy side street, the Other reached up as well, and glittered just as brightly.

"They're all right, now."

His child was no mere construction—this he had learned well. It was a living being with a living mind. It was an entity modeled after him, but *not* him, and now that he was finally getting to know his alter ego, Kirby knew he could call it friend.

And the building next door, hadn't it seemed to project a certain feminine aura all along?

"Lissa," he murmured, his lips brushing her left ear. "It's you."

He saw its many windows mirrored in her eyes, but he couldn't tell just what it meant to her yet. Having a mindprint taken was always a drain. Watching it take on a life of its own was at least as difficult as raising a flesh-and-blood child.

They'd had to haggle with the authorities over all the red tape, but the E-court had finally ruled in their favor. The one abstaining vote, interestingly, came from a human judge and not an AI.

"How did you convince him to release the hostages?" Lissa asked, looking now at his building. "How did you talk him out of killing you?"

Him, Kirby noted, not *it*. Maybe she had already come further than he.

"I let him meet you. He fell in love even faster than I did."

Lissa sighed, a warm softness in his arms. "It's me," she said, sparkling. "How could you resist?"

He kissed her, and for a long time he kept kissing her. The breeze threw her hair across her face, but he smoothed it away and kissed her eyes.

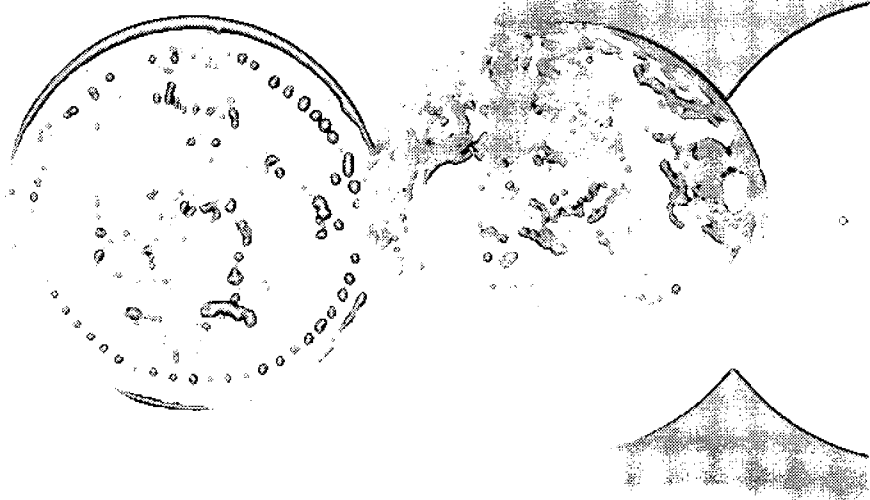
"Did I ever tell you how much I love you?" he asked.

The lights across the street winked off, just for a fraction of a second, and came back on. After a moment, the lights of the other building did the same.

Lissa smiled in the light of their children. "I think you just did," she said. ■

J.W. Donnelly

THE DESTINY MANIFEST



*It's so easy to be sure about things
you can't be sure about!*

Illustration by Broeck Steadman

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Twenty-First Century A.D.

Topaz and sapphire, the half sphere of Earth spun slowly below them. The sun winked on the horizon as the shuttle passed over the Australian coast. Byron shivered with the unfortunate symbology and hoped it wasn't prophetic. The human race had turned inward, had stepped back, abandoning Mars missions and the moon colony alike. He feared it would also lose this last foothold off the planet. Nervous fingers rolled his keepsake. The small, tarnished coin flickered over and under his knuckles.

The silent interplay was not lost on his guest. "You are uneasy, Liaison Holt. Are you afraid of what I might find?" The thick Brazilian accent conveyed challenge.

Byron was worried. As an investigator of the Space Affairs Treasury, Alfonso Dias had considerable say in the ultimate fate of the Biosphere project. An unfavorable report back at the U.N. and . . . Byron mentally kicked himself. His job as project liaison officer focused on presenting a case for a continued orbital presence, not dwelling on the consequences of failure.

Tearing his gaze from the small window, he forced himself to smile at the S.A.T. official. "We're informal with titles on Biosphere III. Please call me Byron." A hesitation. "And yes, I'm concerned. We're just making it as it is. Budget cutbacks cause hardships."

Dias' not-quite-smile was ironic. "The entire world is suffering, Mr. Holt. Many people will have to learn to do with less." His eyes glittered, then darkened. The sun slipped out of sight. The lights of the Newcastle-Sydney metropolis flickered into vision below them before passing from their view.

Byron's cheeks smarted with the insult. The drastic warming trends had hit the American heartland hardest of all. Famine was as much an American problem as it was for the developing world. He resisted the urge for a defensive re-

ply. As an employee of the U.N.'s Biosphere project, he represented not any one nationality, but the entire human race. "We're all in this together. The funds allocated to the project are well spent. Why, the spin-off technologies alone—"

The Brazilian waved a hand in irritation. "Children are starving. Space will wait for us. I'm more concerned with the billions of hungry mouths than I am with the career interests of a few hundred engineers and scientists."

Byron squeezed hard on the ancient coin. "Biosphere is also an agricultural habitat, Investigator Dias. By studying the ecologies we maintain, we can learn much about the environment of our planet." He felt himself slipping into the old, familiar speech. "Biosphere III is the next step towards developing self-sufficient space colonies. One day we'll practice space agriculture on a large scale."

Dias pulled at the cuffs of his gray suit. Byron had been unable to convince the man to don the more comfortable jumpsuits that most space veterans wore. While prepping at Baikonur prelaunch, he had noted with sour amusement that Dias wore real lizardskin boots—so much for conservation. The incident had not encouraged him.

With a rising desperation, he tried to pull the Treasury officer's attention from the window to himself. "We're learning here how to more cleanly and efficiently utilize our resources. Eventually we'll be able to counter the greenhouse effect."

Dias glared back at him. "Always promises. Always later. You tell others to wait, to be satisfied with their lot, that progress is coming. I say to you, Liaison Holt, what progress, what efficiency?" He gestured around him at the cramped confines of the modified Buran shuttle. "You cannot even utilize your own launch vehicles."

Accentuating this point, the length of their impromptu ferry shuddered as the new, experimental M.P.D. engines rumbled into life. The Russian pilot's voice

crackled over the intercom. "Secondary burn initiated. Our esteemed passengers are requested to remain strapped in."

Dias grunted. "It's time to share. The West squandered its wealth and resources, and now asks the rest of us to bear its burdens. Your so-called victory in the long-dead 'Cold War' has come to naught." The thin lips curled in distaste. "Despite the primitive accommodations, these socialists have surpassed you with their magnetician—"

"Magnetoplasmodynamic, or M.P.D."
"What?"

The man's ignorance amazed Byron. Their Russian hosts were cordial, conducting the United Nations guests over a complete tour of the sprawling Kosmograd space complex. The Ukrainian guide had been amiable and instructive, but Dias had not benefitted from the discussion. He had clung to the heated confines of their Mercedes landcruiser while the tall blond Russian proudly pointed out that the vehicle had been constructed at the nearby plant at Tyuratam, "Another example of the union of Russian technology and German money." Dias hadn't heard, only complained bitterly about the cold, staring with an equally frozen expression at the barren expanses of central Asian steppes.

Dias hadn't liked Russia. Byron wondered if the man liked anything. "The Russians are experimenting with electrical propulsion. This old shuttle was refurbished to accelerate ionized gas via magnetic fields. It's a separate technology from the A.S.P., but it's not as if we're keeping secrets from each other. They were very kind to put us up when the Australian launch fell through."

The other nodded. "Exactly what I mean. How can you ask the rest of the world to walk a narrow path when your own house isn't in order?"

Byron took a deep breath. "As you said, we live in trying times. And we've made many mistakes. No one is denying that." He balanced the silver coin on the acceleration couch, watched it slide

back from the artificial gravity induced by the Buran's acceleration. "Now is the time to pull together. History has shown that humanity is largely dependent on the environment." Byron paused, sadness evident on his features. "We're good at controlling things. Perhaps we shouldn't have tried so hard to separate ourselves from nature." He reached for the coin.

The Brazilian's bronzed fingers closed over it first. "Why are you constantly playing with this thing?" The Treasury officer peered more closely at the relic. The visage of some forgotten ruler, shaved face exuding strength, stared back from the ancient metal. A lionskin crowned the head. Dias appeared hypnotized by the coin.

Byron leaned over and gently pried it loose. "It's kind of a good luck charm commemorating the founding of Alexandria. I picked it up in Athens, back at the Olympics of '24."

Dias' manner softened. "Who was he?"

Byron ran a finger lightly over the aged surface. "He was a man with a dream, someone who set out to change his world. His conquest of Persia brought East and West together." Byron couldn't help but think of their current impasse. "We could use some of his vision."

Fourth Century B.C.—Scenario A (Drought)

The long winter persisted, and even now, in the spring of 334 B.C., the thaw delayed. The headwaters of the river Granicus ran low. It promised to be a boring campaign, with few battles between the long marches. Thus it was that Alchylus was unprepared when his friend Parchas rushed up with the news.

"Ho, Alchylus, have you heard? The scouts have returned." The younger trooper wheezed, trapped between excitement and the fatigue of his run.

The sunburned Macedonian scratched his beard in irritation, took one last look at his handiwork. The newly polished

shinguard displayed the dents of several battles. Alchylus spat. "Have you lost your senses, boy? Look around you."

The Illyrian recruit blinked, scanned the immediate vicinity. As far as they could see stretched the bare rock and hard soil of a land not wholly released from winter's cruel grip. "I don't understand."

"Not enough melt-off, the rivers aren't nearly up to full. The Persians won't fight us without an edge, and with that wily Greek Memnon in charge, you can be sure they'll give ground."

"But I just spoke with a couple of the Thessalians. They insist the western Satraps are marshalling their forces near here."

"Across the river? Impossible. We'd crack them like a nut between the heavy cavalry and our phalanxes. The water's too low. No, they will wait for Darius, and pull us further into this desolate land. Gods, I miss the crimson poppies of Pella already."

Parchas' jaw set in a stubborn line. "It's true, and I heard the king will be personally inspecting all the units."

The grizzled soldier paused. "Himself? Well, why didn't you say so?" Alchylus snatched up discarded equipment. "This place is a mess. Don't just stand there. Lend a hand."

Experts at camping in the field, the two companionably and efficiently straightened up the area. "You're sure it will be Him?"

"As certain as my spear arm strikes true." Both were caught up in expectation of the imminent visit.

Alchylus strapped on his shortsword. "Last time He spoke with me. You recall, when my feet were blistered? Actually looked at them Himself, said I should be fine." The gruff face beamed with pride at the memory.

"Maybe He will let us fight in the vanguard." The younger man's eyes were round.

Alchylus laughed. "No, that's the honor of the foot companions, but I'm sure

you will get your fill of Persians." The thought calmed the pikeman. "But, I don't understand why they offer battle. This could end up being easier than pacifying the hill-land tribes. I figured Memnon had more smarts to him."

That night He did indeed speak with them, mesmerizing them with His smooth-shaven countenance and flowing gold hair. He said they would fight bravely, and somehow they knew they would. They slept with dreams of glory.

At dawn the bulk of the army crossed the shallow waters, and crushed the scattered resistance almost before it could form. The road to the interior lay open. The local villages welcomed them with little fanfare and bartered local Asian wares for the troopers' silver staters, the coins that bore the likeness of their king. The west had come to the east.

Twenty-First Century A.D.

The two had spent the last few minutes in an uneasy silence. Dias mulled over the liaison's words. Byron, on the other hand, nursed a budding hope and left the Brazilian to himself. Time stretched on, and Byron could imagine the dispersed structure of Biosphere III drawing ever closer.

Onward and upward the shuttle glided, threading the near-vacuum in a curving arc towards its destination. The flight from Earth to station, perhaps the end of the dream to which he had devoted the last decade of his life, loomed more inevitable with each passing moment. Involuntarily Byron peeked over at Dias. The small man, deep in thought, took no notice.

Byron tried to resign himself. Either Dias would see reason or he would not. Tired of fiddling with the coin, Byron peered out the window. The pilot rolled the shuttle to approach Biosphere, blocking Earth from sight. Only the blackness of space greeted his search for reassurance. Strange how far away the stars could seem.

Byron brooded, moody gaze intent on everything and nothing. The effect was so subtle in coming that at first he scarcely noted it. Eventually the strangeness began to impinge on his consciousness.

Sparks, dim firefly flecks, streamed past the window. Byron leaned forward to catch a better view. Forward and out of sight sat the shuttle's nose and crew compartment. To the rear . . . Byron caught his breath. The short, stubby wings of the altered Buran swept back. An orange halo danced about them. Ghostlike, ranging from yellow to dull red, it clung to the fringes of the shuttle.

Byron's preoccupation brought the U.N. officer out of his reverie. Dias struggled with his harness to get a closer look. "What is happening out there?"

The liaison didn't shift his eyes from the spectacle. "Shuttle glow. I haven't seen it in years."

Dias shifted uncomfortably. "Is it dangerous?"

This time Byron did look at him. "No, it's just another difference between the Russians' technology and ours. It has to do with atomic oxygen. You don't get much of the effect with our craft since we started shielding with the new zirconium-halfnium ceramics. The A.S.P. is a giant step forward."

"There you go with that again. What is this A.S.P. you keep talking about?"

"The Asp?" Byron was surprised and subtly pleased by Dias' questions. "The Aero Space Plane, the world's first ram/scram-jet hybrid." At the smaller man's blank look Byron continued. "The lift vehicle we were scheduled to take before the launch was scrubbed."

Dias paused, thought hard. "And you are not upset at having to accept charity from these Russians?"

Byron grinned. "I wouldn't call it charity. Lift costs have plunged, but it's not cheap to boost a payload. Moscow is always looking for a fresh infusion of dollars."

"A conciliatory attitude towards a na-

tion you spent half a century prepared to atomize."

"Some of us would like to think that we're learning to live with each other and our planet. The Russians maintain a space program apart from the United Nations, as you well know, but I wouldn't classify them as adversaries. We try to get along."

Dias face still held a trace of mockery. "Especially when your own systems are not working."

For a brief second Byron was confused. "Is that what you thought? The Asp has performed flawlessly. No, we lost our ride when operations were temporarily suspended at the request of the Australian government."

Dias feigned shock. "Will wonders never cease, Western powers bowing to the requests of a smaller country?"

Byron frowned. "Treasury officer Dias, I was born in the States, and much of my work is with Berlin and Washington. However, like you, I am on detached duty with the U.N.'s World Development Council. I believe that I've achieved broadened loyalties."

Dias slowly nodded. "Perhaps, that is what I am to determine. You will be heard, Liaison Holt. I owe you that." Another pause. "Old divisions die hard."

Byron suspected that such an admission came hard for a proud man like Dias. "You are familiar with the Asian resettlement program?"

It was Dias' turn to nod knowingly. "Yes, the second Cambodian debacle, and the Honshu earth movements four years ago. I was on the committee that approved the budget for the sealift. What they've achieved in the desert is remarkable."

"I agree. That was sand and rock a decade ago when the first Asp strips were laid. Now the landings are rattling quite a few cages. Eyre Lake isn't the isolated spot it once was."

"Meaning?"

"Noise pollution. The sonic booms

ANALOG

have upset more than a few of the new neighbors."

"So they're looking for other corridors." Window forgotten, Dias sat back to consider Byron's statements. Gentle pressure tried to pull them from their harnesses. Sunlight poured through the aperture as the shuttle slid forward to dock.

"We're about there." Apprehension and eagerness mixed within Byron.

Dias groped for words. "I'm impressed with your candor, Liaison Holt. Your ability to admit that the West had made mistakes is . . . unexpected."

Byron nodded.

Dias pressed on. "After we dock I'll be busy with officials and politics. You said that Biosphere III could be an answer to global warming and the famine. Explain yourself."

"You might be surprised how closely related history and ecology are."

Dias motioned for him to continue.

Byron plunged ahead. "It's long been known that man affects his environment, often adversely. Recent examples include the Russians' destruction of the Aral Sea and the depletion of your own rain forests in Brazil."

Dias stirred and started to speak, then gestured agreement.

"It's not that simple. Nature also affects us, and history can hinge on this. For instance, what if tardy winds had not delayed William the Conqueror and the Normans had met a fresh Saxon army rather than one tired by a previous battle with the Norwegians? It could have changed the course of English history."

"A typical Western example," noted Dias with asperity.

"But an accurate one. And it can develop into a negative feedback type of situation. Man affects nature which in turn affects man, and so on."

"That is not necessarily a bad thing," interrupted the Brazilian. "Progress has its price."

"True enough, but even minimal

changes in the environment can boomerang. Case in point—the so called 'little ice age' during the medieval era. Average worldwide temperatures plunged a mere half-degree, yet this was enough to ruin the agricultural infrastructure and destroy the Viking colony on Greenland. Thus the Scandinavians never pressed further west to colonize the Americas. Your ancestors could well have spoken a Norse dialect instead of Portuguese."

"And this relates to Biosphere III?"

"Carbon dioxide levels have more than doubled in the past fifty years to six hundred parts per million. Global temperatures are up almost two degrees Celsius. We can't even begin to gauge the effects on the jetstream and the oceans, though the cause for the cropkills and the famine is pretty obvious. The Biosphere has several self-contained modules that duplicate Earth habitats. We can control the climates, experiment with what might be going wrong."

"And then learn what to do right. I understand the concept. But tell me, couldn't you instead do this more cheaply on the surface?"

"Some of it. However, Biosphere III is much more. We're looking at breakthroughs in agriculture, life support technologies, developments in alternative fuels and medicine. There's even talk about utilizing photosynthesis as an alternative energy source."

Dias almost chuckled.

Byron waited, expectation and enthusiasm buoyant in his face.

Dias regarded the liaison sincerely. "I can make no promises, but I will try to judge fairly."

"That's all I ask."

A slight nudge preceded a hollow clicking sound. The intercom chimed. "Honored guests, we have arrived at Biosphere."

Byron cursed the Russians for their lack of a warning, but his heart wasn't in it. He was thinking of reprieves.

Fourth Century B.C.—Scenario B (Temperate)

It was a fine morning. The foreign skies of Asia Minor promised riches, an empire to be plundered. Philip's son, king and general, descendant of Achilles, had returned from His quest. Now, armed with the shield of his ancestor, He would lead them into Persia.

The signs were auspicious, the weather ideal. Thus, they struck quickly. A short crossing took thirty-five thousand rough-hewn Macedonian veterans, heroes of Charonea all, to the doorstep of the ancient enemy. Like a colossus it stretched, from the Dardanelles to the Indian Punjab, from the barbarian steppes to the mountains—the Persian Empire. A formidable task lay before them.

More immediate a problem was the horde of howling barbarians clustered across the river. Alchylus tightly grasped his weapons. He hefted the round wicker shield up higher. "Look at them, Parchas, acting like they have no fear in the world." He peered over at his friend.

Parchas' face was mostly hidden under the blue flanges of his Phrygian helmet. He made no answer.

"Nervous, boy?"

Parchas thickly swallowed, indicating agreement.

"As are they." Alchylus pointed to the wild mass of Asiatic horsemen. "They try to convince themselves otherwise with all that noise, but they're not real soldiers." Several of the tunic-clad archers pulled back their shortbows. The arrows fell harmlessly into the water.

The time for talk ended. The missiles had come too close. The order went out, and all but the first five ranks raised their sarissas, fifteen-foot-long pikes, to cover their heads from further attack. The mighty phalanx, long rows of men sixteen deep, primed for battle.

The breastplate chaffed, and the kilt itched. Alchylus ignored the symptoms,

started to look for his first opponent. Waves of light cavalry pressed upon the other shore. His vision fastened on an area of calm. Memnon and his Greek mercenaries stood disciplined and ready. Alchylus burned with hatred. "Damned hoplite traitors." He prayed to whatever gods who were listening that the flow of battle would take them in that direction.

The Macedonian trooper was so fixated on his bloodlust that he almost didn't see the attack when it came. A movement caught his eye, and he whirled right. His mouth popped open in dismay. "He's attacking by Himself."

The ground shook, as capes flying, the massed heavy cavalry of the Royal Squadron, the Agema, crashed across the waters. The two troopers, and many of their comrades, stood amazed and dumbfounded.

"They'll never make it," yelled Parchas. And yet, through the hail of arrows, and up the slippery bank, the Companion Cavalry rode. The Persian line buckled as the serrated ranks of javelins drove home.

For a brief instant Alchylus saw a lone helmet, crowned by twin white plumes, in the lead. Of course this would be so—He was impulsive and impossibly brave, born to unite all men under one rule. The men would follow Him to the ends of the Earth.

"And why are we not following?" muttered Alchylus.

The signal was given as Lord Parmenion ordered the rest of the army into the fray. The phalanx charged into the beachhead the cavalry had carved.

The Persians fought bravely, but stood no chance against Macedonian discipline. They had a hard day of it, but at length the enemy broke, and He had His first victory in Asia. Alchylus suspected that there were tougher times ahead.

Twenty-First Century A.D.

Byron and Dias relaxed in the earth-sider visitors' quarters. The Treasury of

ficer hadn't taken well to low gravity, and spent much of his time in the modules situated low down on Biosphere's axis of rotation. Gingerly he sipped at a small tube of wine.

Byron watched with keen interest. "What do you think?"

"What, the station or the wine?"

"Both."

"The wine is dry, but I like it. It must have been quite expensive to import." He swished more of the pale violet liquid in his mouth.

"Actually, we're considering exporting under our own label."

The Brazilian's eyebrows rose. "You made this here?"

"Home grown, home bottled."

"Impressive. The entire setup, that is."

"Then, you will recommend that we keep our funding?"

"I cannot say for sure. I've seen much on which I must think, and I have my own battles to fight. However, your people here have been most helpful, and have answered all my questions with honesty and enthusiasm." The dark man searched for words. "They seem filled with a sense of expectation."

"It's heady stuff, working towards saving one's world."

Dias rose, slowly worked his way over to the pod's lone window. From this angle one could look 'up' at much of the thousand-foot-plus length of Biosphere III. Clusters of modules, buttressed by kevlar tethers, squatted about the habitat's axis like bugs on a stalk. Shadows lengthened as Biosphere's slow rotation brought the sun into view. Still queasy, Dias turned away.

"It does take some getting used to." Byron's tone was sympathetic.

Dias sat. "Space is not for everyone, but I will agree with you that it has much to offer the human race. I was especially taken by the crops."

"You mean the intensive agriculture biomes? We're not yet prepared to feed your hungry billions, but we're close to self sufficiency." Byron pulled out his

coin. "You have to crawl before you can walk."

"The coin again."

"He was an inspiration, if a little before his time. The world wasn't ready for unity in the fourth century B.C."

"And it is now?"

"One can only hope." Byron switched to a lighter subject. "I'm glad you enjoyed your stay."

Dias slowly nodded. "That is one way to phrase it. Rest assured that my report will be complete." He looked back up. "The newness of it all is overwhelming."

"It's not that new."

"Oh?"

"The concept actually originated late in the twentieth century. Biosphere II was a small world unto itself. A group of scientists assembled it out on the Arizona desert. There were a lot of problems, and people at the time thought they were wasting their efforts. But, the concept was sound, if not popular."

"Much the same as the situation you face now. And what of Biosphere I?"

"That's the planet." Byron smiled at the look of surprise. "Biosphere I is Earth itself, the greatest experiment of them all."

Byron's expression was mirrored by Dias' own. "And thank you for the history lesson. You are very good at what you do."

The American sketched a brief bow, then sobered. "Your shuttle is due within the hour."

"Yes, duty beckons." Dias patted his stomach. "I wish I could say that I would miss this place, or the ride back to the docking bay."

As Dias said this Byron crossed the small room and punched in a command on the touchscreen. Upstation from them a small cubicle slid on its magnetic cushion down the shaft of the Biosphere. "Your trusty steed is on its way. I have a parting gift for you."

Dias' eyebrows rose. "Indeed?" He stared curiously at the transparent sphere Byron handed to him. There

were no visible openings. Small creatures flitted about in it. Dias inspected it more closely.

"The sphere was made from a perfect crystalline compound, another small miracle brought to you from space."

"Water and algae." Dias searched for a seam. The structure was smooth to his touch.

"And shrimp with a healthy dose of microbes."

"What is it?"

"It's called an ecosphere. Early versions were developed by the old NASA. Biosphere, unlike the Earth, is not a totally self-contained system, at least not yet. These little worlds are. The one you're holding has been going strong for over four years."

"Really." Dias' hands moved as with a life of their own.

"Just add sunlight."

"A microcosm. Byron Holt, you've made your point. Not that I subscribe to everything you've said. I agree that the greenhouse effect must be countered, but I think you overstate the impact the environment can have on our civilization."

Byron spun his keepsake, stuffed it into one of the many pockets of his jumpsuit. He hid his half-smile. A green light indicated the arrival of the shaft cubicle. "I'll see you to your shuttle. Hope you don't mind more of those Russian accommodations."

Fourth Century B.C.—Scenario C (Flood)

Clouds roiled in the west, harbingers of more difficulties to come. First had been the treacherous crossing of the Hellespont, then the gods' cursed drought with its cloying heat, and now this sudden storm. Waters, dangerously high, thrashed along the steep banks. Directly across from their position, horse archers shook their bows in defiance, but their cries were drowned out by the maelstrom. The omens had not been good.

Alchylus was beginning to doubt the wisdom of this entire venture. The heat sapped the army, and morale sank when rumors reached them of a Spartan revolt back home. Then the rains had finally come on the eve of their first major encounter with their enemy. He eyed the surging floodwaters with foreboding. "No chance of crossing that. It might as well be the river Styx."

"What?" came back Parchas' reply.

Alchylus signaled for silence, and pointed to the low ground in front of them.

The officers were conferring. Good. Now they could withdraw to a dry camp, perhaps pull back to the coast.

They could not pick up the words, but it was evident that an argument ensued. Astride His powerful warhorse Bucephalus, the king exchanged angry gestures with dour Parmenion and young Philotas.

"I wonder what that's about?" yelled Parchas over the thunder of the waters.

"Don't know, but look, it's breaking up." Thick drops of moisture splatted on the desiccated dust lately turned to mud. "More rain. Now isn't that odd, Him leaving the field to His marshal?"

The two could make no sense of it. Parmenion had just stared when the king rode off.

Minutes later they had their answer. The royal cavalry trotted up to the torrent. Alchylus watched in horror as Bucephalus was urged into the froth. As one the bodyguards followed.

"We have to help." Parchas' declaration echoed up and down the line. They would follow their king to the ends of the Earth. Formations broke down as men slithered through mud to attempt the crossing. Many tried the waters, only to be swept away in the currents.

Following a king to the end of the Earth is one thing, but the headlong plunge into certain death was a more final journey. The army wavered. Adding to the confusion was the sporadic missile fire rained down by the gleeful Persians.

Alchylus Parchas tried, wallowed in the thick mire with hundreds of others, but it was hopeless. Then there came cheering from the Persian side, and a great wail from the Macedonian contingent. "The king is drowned. Alexander is dead."

Their officers immediately ordered a capable and fairly ordered withdrawal. The army escaped with few casualties.

"I knew it," Alchylus cried, "this strange flooding is a sign from the gods. We are undone. And now He is gone." They wept all the way back to Macedonia.

Twenty-First Century A.D.

Standing in the docking module, one could just catch a glimpse of Earth. The imaging on the pod's single touchscreen indicated the path of the shuttle as it eased up to the station. Liaison turned to Treasury officer. "When you first came up, I had my doubts. Still, I think things worked out for the best." He bowed. "Well met."

Dark eyes sparkled over a sardonic smile. "You would probably say that we're making history ourselves, proof that our decisions on how we respond to the environment are more important than its effect upon us."

The younger man grinned. "You have me at a disadvantage there. It's true that Biosphere needs your help. However, I could argue that our planet needs the help of this facility."

"You debate well. We'll call it a draw. Perhaps we change history, perhaps it changes us."

"The warming trend has to be reversed."

"Agreed. Perhaps you should get your funding."

The screen signalled that the docking had been completed.

"Not much on informing their guests before time, are they?"

"They're a proud people. That's the price of sharing the Earth with them."

"I suppose so. I'm back to the Coun-

cil, then." A probing gaze noted the empty hands. "What, no good luck charm?"

Bahron reached within the folds of his saffron tunic, revealed the charm hanging above his trousers. "Still there, but I'd like to think you are now our luck, Dessus."

The Magian Treasurer admired the ancient relic for one last time. "An interesting piece. I'd like one myself. From across the Great Western ocean, you say?"

"Yes, a token wrested from the barbarians of the southern continent."

Dessus shook his head in admiration. "Your knowledge of history and other cultures helped sway my decision." He eyed the Mede appraisingly. "You could come with me to Urmia, argue your case before the Council."

Bahron ruefully declined. "My friend, I cannot. The Avesta mandates that I better serve the cause of good here. In the words of the Great Magi, 'Who sustains the Earth here below, and the space above, that they do not fall?' My best service is with the Biosphere."

"Eloquently put." The screen glowed red. "What is taking them so long? Latins act like they own the world."

"Or at least half of it," chuckled Bahron. "Seriously, Dessus, their engineering is impressive. They've brought up their newest star galley to ferry you back."

"New technology with the most spartan of comforts. How typically Roman."

Bahron ignored the other's complaints. "With peace breaking out, we've integrated our operations with the Latins'. They'll take you straight to Khurasan spaceport, and from there to Elam."

An amber glow replaced the red light. The thick Mediterranean accent of the pilot crackled over the speaker. "Honored guest, please prepare for boarding."

The two men grasped each other's shoulders. Dessus spoke first, switching

to the ancient tongue. "May your good deeds speed the way to the final judgment."

Bahron responded, also in Pahlavi, "And may the rising waters of Granicus carry you to victory in your quest."

"That they will. Our empire has existed for three thousand years. We will endure in this time of trial." Dessus deviated from the solemn ritual to get in one last dig. "And that is why these minor

temperature fluctuations will be overcome. What is a few degrees in the face of thirty centuries of culture and progress?"

Bahron didn't rise to the bait. "Your shuttle is waiting. Long live the Great King."

"And long live the Persian Empire." The two men turned away, both intent on setting their world to rights. ■

IN TIMES TO COME

Our last issue of the 1900s has several unique features. Robert R. Chase's cover story, "Heat," was inspired in part by a dramatic painting by Ron Miller depicting a thunderstorm on Venus, and in turn inspired a *new* dramatic painting by Ron Miller, which we will offer as our cover—much the same setting, but incorporating some new elements from the story. The other main inspiration was the author's observation that writers haven't been doing much with our recently acquired knowledge about what Venus is really like, and it's a place of such infernal extremes that there's a lot of story potential there. He was right!

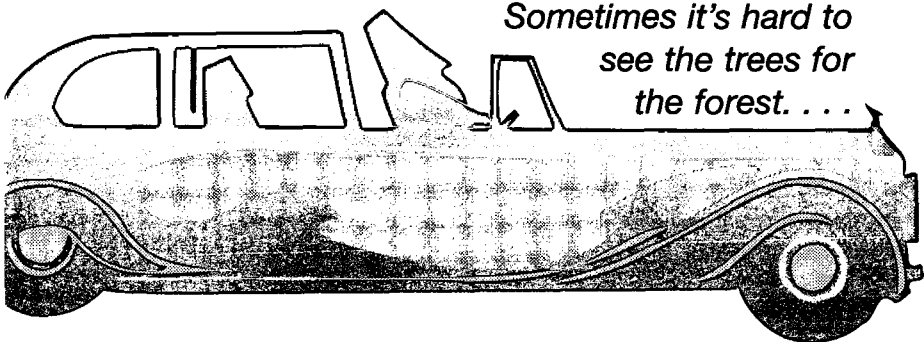
Our December issue will also feature an unusual experiment in collaboration with our sibling magazine, *Asimov's*: a pair of "mirror novellas." The same incident is never really the same for different participants, even when they are in some sense the same person. You've read lots of stories about a time traveler interacting with his older or younger self, but as far as I know, Harry Turtledove is the first to tell the whole story as experienced by the older and again as experienced by the younger. Each is a complete, self-contained story, in a sense a mirror image of the other, so you don't *have* to also buy the December *Asimov's*—but you'll probably want to, because the two stories together are surprisingly much more than the sum of their parts.

We'll also have a little something for the season—maybe even two things for the season, if you count the ultimate travel horror story (I'm not exaggerating!) as seasonally appropriate. Plus fiction by Charles L. Harness, Stephen L. Burns, and at least one promising newcomer; and a science fact look at the likely future of air traffic control.

Brian Plante

SEEN ONE HUMAN

*Sometimes it's hard to
see the trees for
the forest. . . .*



I had been on Kerrax three long years when the Rolls Royce, an old Silver Seraph, wheeled into the parking lot of the Rio Diner one last time. It was probably the only Rolls on the planet, and pretty hard to miss as I watched from inside the diner, where I waited tables. I was glad to see the vehicle pull in, since it usually meant a big tip for me that night. To my surprise, Joe, the chauffeur, popped out of the *back* seat of the car and ran around to open the front door. The car's owner, Warbucks, a native Kerran, got out of the driver's seat. Who even knew a Kerran could fit behind the wheel of a human car, much less drive it?

Warbucks was a strange one, even for a Kerran. That wasn't his real name, but it was what I called him. In his own tongue, the name had an odd glottal sound in the middle of it, but "Warbucks" was close enough, and he seemed to like the way I mangled it. "A typical Earth accent," he'd say, as if there were only one kind of accent back home. It was just one indication of how the Kerrans looked down on

humans as second-class beings, assuming we were all interchangeable. It was true the Kerrans were technologically superior to us, but it was infuriating being treated like a race of smart chimps. To the Kerrans, we looked alike, sounded alike and all had the same hopes and dreams. Seen one human, seen them all.

The fact that Warbucks owned a Rolls Royce, so completely out of place on this world, was just one indication of how odd he was. Besides the great expense of transporting the vehicle here from Earth, he had to import the fuel, too, since the local vehicles ran on fusion engines. And a human automobile could hardly be appropriate for a Kerran, even with a chauffeur to drive it. Kerrans were *big*. Not especially tall or fat, but really wide. At the diner, we joked among ourselves that Kerrans look like flattened Easter Island heads with arms. "Slabs" is what we called them, but not to their faces. A Kerran took up a whole human couch all by himself, so a human automobile couldn't have been comfortable for them. Warbucks was an oddball

for his kind, but I liked him. He had personality. And money.

Warbucks eased himself out of the car gingerly, and Joe also held the rear door to help another Kerran out of the back seat. The two Kerrans waddled across the parking lot and entered the diner. Marie, the Rio's hostess, seated the pair immediately at one of my tables—everyone knew Warbucks was my customer. I practically had him trained. He usually dined alone, so I didn't know who the other Kerran was.

Back home on Earth, the Rio Diner would have merely been another so-so restaurant among thousands of others just like it, serving up plain food for common folks with big appetites. Here on Kerrax, though, the Rio was a trendy spot, with an alien mystique that made it an adventure for the locals. It was very chic and upscale to "go human" for a night. Of course, it couldn't be anything *but* upscale with the cost of importing nearly all our provisions from Earth. And if the food was mediocre, the Kerrans, smug in their phony display of love for our alien culture, didn't know the difference. It was really just a hash-house with outrageous prices, but to the Kerrans it was haute cuisine.

I brought over a pair of menus to the wide table and bench seats where the two of them were seated. Some things, like our oversized tables and booths, couldn't be too Earth-authentic or it just wouldn't work for these beings.

"Good evening," I said in my dreadful Kerran, and added "Gentlemen," in English. I could have said the equivalent of "gentlemen" in Kerran, but the slabs came to the Rio for some human culture, so they expected to be addressed with the English title. It was a silly game, but I played it nightly and took home my tips. Warbucks was wealthy, and was always good for a big one.

"Hello, Lilsa," Warbucks said. That's another thing I liked about Warbucks. He almost got my name right. Kerrans have a habit of calling all humans the

Kerran equivalent of "you." My name is Lilsa. Not Elsa, not Lisa, not Lill, and damn well not "you," and I corrected anyone, Kerran or otherwise, who got it wrong. Warbucks pronounced my name "Leelza" but it was close enough. At least he tried.

"It is fortunate to see you again," he spoke, in his oddly accented English, showing off his cultural knowledge to his companion. The other Kerran nodded to Warbucks and chattered away in native speech too quickly for me to follow, but it sounded like he was impressed with Warbucks' *savoir faire*.

In Kerran, I recited the daily specials, which were really just regular items from the menu that we were overstocked on, and told the "gentlemen" I'd be back after giving them a few minutes to make up their minds. I dashed through the kitchen door and around the back entrance, where Joe was waiting for me.

Joe was a good friend. Not exactly my boyfriend, but there was something there that might blossom under different circumstances. His real name was Georgio, but he let the Kerrans call him Joe, since it was easier for them to pronounce, and just slightly better than "you." I called him Joe too, at his insistence. He said it made the Kerrans feel stupid if they heard me calling him one thing while they called him another. Joe always told me that what the Kerrans thought of us was important, since we lived off their kindness. I argued that "kindness" wasn't the right word, since the Kerrans mostly despised us.

It was funny, but our situation on Kerrax had brought Joe and me together and yet kept us apart at the same time. Misery loves company and we both shared the bond of being stuck in the same predicament—we had worked off a couple of years of voluntary indentured servitude to get out of debt, and now we were laboring to save enough money for the return trip to Earth. That was what kept us apart. We knew we

were both short-timers and the first one to scrounge together the fare would be gone in a flash. There was no point in becoming too entangled in each other's lives, although I thought I might look Joe up once we were both safely back on Earth.

Unfortunately, it was taking a long time for both of us to save any money. Once released from our obligations of servitude, there were few opportunities for free humans on Kerrax. While the Kerrans had seemed friendly enough back on Earth, here on their home world they treated humans as second-class citizens. It wasn't just the prevailing attitude, but the law. Humans were legally defined as "half a normal person" for their census. The employment opportunities available to humans were relatively low-paying jobs like gardening and housecleaning, and there was little chance to move up to anything better. Joe had been lucky to get a job driving that ridiculously inappropriate vehicle for Warbucks. It was easy work and paid better than digging ditches.

"Something strange is going on," Joe said as I greeted him outside the diner's back door.

"I'll say. I saw that car of yours pull up and Warbucks was driving *you*!"

Joe chuckled. "He's been asking me to show him how to drive for months, and I've been humoring him."

"What for, I wonder?"

"He's moving offworld. Soon. His house is all packed up, and he's going to set up some kind of business. On Earth."

Earth. My heart fluttered just at the mention of it. Warbucks was going to Earth. It could be the moment Joe was waiting for—a free ride back home. At first I was jubilant, then I thought about him leaving, and stopped smiling.

"D-d-does this mean he's taking you along with him?" I said.

"No, I don't think so. When he asked me to show him how to drive, I just thought it was another one of his screwy interests in Earthly things, but

now I realize it's because he intends to drive himself around when he gets there."

"You should tell him the rich people don't drive themselves on Earth," I said.

"He doesn't want to appear too well off. He wants to do things for himself."

It made sense. Warbucks wasn't just play-acting at learning Earth culture, he was getting ready to go native. And now Joe was about to lose his job and I was going to lose my best tipper. And we'd both be stuck on this planet that much longer.

I told Joe to wait by the door while I went out into the dining room, dropping off a basket of bread at Warbucks' table. The two Kerrans were ready to order. Or, at least, Warbucks was. He ordered for both of them, making a big show of speaking in English.

"We will each have a strip steak, cooked medium rare, and a baked potato with butter and chives, the house salad, and wine."

He could have just asked for "the usual," since that was his typical order, but it was obvious he was showing off for his companion.

"Is the house wine OK for you boys or would you like something off the wine list?" I asked, figuring I might get him to kick in a bit more for the price of the meal and the tip, since he was obviously trying to impress the other Kerran.

Warbucks appeared flustered at the unexpected question, but came back with, "A moderately priced bottle of Chablis, chilled, would be acceptable."

I made a face. For anyone else, I would have brought out the Chablis without a word, but Warbucks was different. He really made an effort to understand Earth food and customs. Other Kerrans would ask for odd combinations of things, like ketchup on mashed potatoes or chocolate syrup on a hot dog, and in those cases I usually just shut up and gave them what they asked for and everyone was happy. But Warbucks was

always asking me if it was OK to have sugar on his pork chops or gravy on the salad. He seemed grateful when I told him how we really ate back home and kept him from eating repulsive combinations, even if he would have preferred it that way. I also taught him proper table manners, since Kerrans don't normally use the same kind of dinnerware we do. We tried to keep things as authentic in the Rio as possible.

"Perhaps a Burgundy would go better with the steaks," I suggested.

Warbucks exchanged glances with his companion before looking back to me. "Of course, you're right," he said. "Thank you for your assistance."

The companion observed without comment.

I buzzed around the two other tables I had going to check on things and dropped the Kerran's order off to Larry in the kitchen. Then I brought out the salad and wine. After serving them, I took a plate of salad out to Joe at the back door. Simple Earth staples like lettuce and beef were hellishly expensive to get on Kerrax, so free food from back home was one of the nicer perks of working in an Earth restaurant.

"So what are you going to do now?" I asked Joe.

"I have to find a new job," he said between bites. "Can you use another hand at the Rio?"

"No, not really. Why don't you tell Warbucks his driving isn't good enough, and that he'll need to take you along?"

"That won't work. He drives just fine. He's a very good learner."

"Yeah, so I've noticed. When is he leaving?"

"It could be any time now, I think. The house is all packed up, and he's told me my position will soon be 'negatively impacted.'"

"Wow, he really has learned Earth culture," I said. "How close are you to getting your ticket home?"

"A little over halfway, if they don't raise the fares again."

"Yeah, me too. Maybe I could con him out of a really big tip."

"Not that big."

"Probably not, but I'll see what I can do."

Back in the dining room, Warbucks and his companion had finished their salads, so I cleared the plates, checked on my other tables, and went into the kitchen to find their order waiting. I served it with a flourish. Warbucks looked eager to tear into his steak, and I pointed to the napkin to remind him to place it on his lap.

"Again, many thanks for your guidance," he said as he covered his wide lap with our towel-sized napkin.

"I understand you'll be traveling to my home planet," I said. "I want to make sure you know all the correct table manners."

"Yes, it's true. I am going to oversee a business enterprise on Earth. I owe you much gratitude for instructing me in the ways of your people."

"Well then, I hope you express your gratitude with a big tip. It is a custom that the patron be especially generous when he is saying farewell."

Tipping isn't part of Kerran culture and the waitstaff at the Rio always let it be known that on Earth, customers were expected to add fifteen percent or more if they wanted to do Earth dining right. I had worked hard to get high rollers like Warbucks comfortable with spreading some wealth around. He thought it was a quaint custom, and went along with it to be authentic when he was going human, just like he used the knife and fork instead of the Kerran claw utensils. There was no embarrassment about asking for a tip. Kerrans didn't know it was crass to blatantly request one, and we didn't tell them.

"You mean I should give more than my usual twenty percent, Lilsa?" Warbucks asked.

"Much more," I said. "But only if I have been of service to you."

"You have indeed," he said. "I will strive to be generous."

"Very good. Enjoy your meal, boys."

The two slabs smiled in the Kerran way, a pretty scary expression until you got used to it, and started eating.

I brought Joe a baked potato and some rolls. He appreciated the Earth food, since it was too expensive for him to afford otherwise.

"What kind of business is Warbucks going to be running?" I asked.

"Some sort of exporting outfit. Works of art, apparently. Paintings, sculpture, antiquities."

Joe and I looked at each other, then laughed. Like the Kerrans could tell the difference between a Dutch Master and a velvet Elvis. To them, it was just crude aboriginal art, but the artisans on Earth were happy to sell them whatever they'd take. Kerrans prided themselves in appearing cultured in the ways of all the dozen-odd intelligent species they had encountered.

"You know, Joe, you really should try to convince Warbucks that art dealers have an image to uphold and he'll need a chauffeur."

"He has his ticket already, and he only bought one. He showed it to me."

"You've seen it?"

"Yeah, it's actually quite beautiful. Much nicer than the paper tickets issued back home. You should ask him to show it to you."

On my next trip to the dining room I did just that, and Warbucks was happy to oblige. Joe was right, the ticket was beautiful. It was a round green resin wafer, embossed with an animated hologram of the Earth, and a few lines of Kerran script. I looked closely and saw the departure time was made out for later that same evening. He was leaving in only a few hours. A few hours and Joe would be out of a job, and I'd be without my best tipper.

I pointed to the miniature globe on the ticket and asked, "What part of Earth will you be visiting?"

"A most populated area," he replied. "The People's Republic of China."

I smiled and nodded my head like I was familiar with China, although I had never been there. Then it struck me.

"Mr. Warbucks, sir, I feel I must tell you something important about the trip you are about to take."

"Yes, what is it?"

"Well, the Rio Diner is sort of an East Coast kind of place. That's in the United States."

"Yes?"

"Well, you see, the food here at the Rio isn't much like what you're going to find in China. And the customs are totally different too."

"How is that? You are all human."

"But that's just it," I explained. "It's a mistake to think of humans as one homogenous group. It's not just some rinky-dink little village but a whole planet. I've been serving you food and teaching you customs from my homeland. Why, in China they don't even use a knife and fork. They eat with long sticks. And you won't even recognize any of the food there."

"Sticks? I will not fit in if I use a fork?"

"Not at all. In some places, they might not even understand English."

Warbucks' companion sat stone-faced through this, then uttered a very human sounding, "Uh-oh."

"I'm sorry, Mr. Warbucks, but everything you learned from me is all wrong for China," I said. "If only I'd known! Um, would you two care for some coffee and a dessert?"

The two Kerrans chattered back and forth between themselves in their native tongue. The companion was apparently a business associate, and he was very agitated. I really did feel sorry for Warbucks.

"Perhaps I'll give you two boys a bit more time to decide," I said.

"Check please," Warbucks shot back.

So maybe I wasn't going to get such a great tip that day, I thought. But perhaps now Joe would be able to keep his job—unless he was replaced by some rickshaw driver. I rang up the check and

placed the folio on the table and started back toward the kitchen to tell Joe what had just happened. Warbucks and his companion got up from the table almost immediately and stormed out of the Rio, and Joe came running out from the back of the diner to open the car doors before I could say goodbye. This time the two Kerrans got in the back seat and Joe took his usual place behind the steering wheel and drove off.

There, in the folio, with the check, was the money for the meal. Just enough Kerran cash to cover the check and no more. The Kerran had stiffed me out of a tip.

I was upset as I cleared the table. I had maybe lost my best and most favorite customer, and Joe's job was probably up in the air, too. I hadn't really meant any harm, but Warbucks had been the one to make the mistake. The Kerrans think of humans as less than a "normal" person, and that's their problem. They don't understand we're complex enough to have significant variations among us. Seen one human, seen them all. That was their problem, and I had saved Warbucks from making an even bigger mistake, taking his studied Western ways to China. He should have given me an enormous tip.

Then, on the table, peeking out from under a napkin was a flash of green. I saw a bit of the hologram of Earth, spinning under the cloth. It was his ticket. Warbucks had left me his ticket to Earth as a tip! I froze with excitement, then I picked up the napkin to reveal the ticket . . . was destroyed. The green wafer was ripped jaggedly in two and the half that stuck out from under the napkin was all there was. Warbucks hadn't just stiffed me out of a tip, but mocked me with the thing I wanted most in this world, a ticket home, ruined.

Back in the kitchen, I cried to Marie about the stupid slab and told her not to put him at my table if he ever came into the Rio again because I wouldn't serve him. I didn't care how much money he

had, I didn't need the humiliation.

"Look," Marie said, "this is no humiliation. This is a ticket home."

"Well, half of one anyway. It's ripped."

"Yeah, but this is half a *Kerran* ticket, and to them, we're only half a person. This is all you need, Lilsa."

I didn't know whether this would work or not, but the guys in the kitchen assured me it was true. I could leave. Tonight. I only had a few hours to get to the spaceport and use the ticket.

I called to tell Joe my good news, but only got his recorded "leave a message," so I did. Then I ordered the bankcom to transfer my entire credit balance into Joe's account. He needed it more than I did now. The next time he checked his balance, he'd find the extra money and book his own ticket home.

And then I went to the spaceport. I made the flight with only minutes to spare, and yes, they took the half ticket as one full human fare. I boarded and found my way to the seat. The ship was outfitted with the wide Kerran-sized seats, of course, each one big enough to seat two or three humans. Which was a very good thing, as there was already someone else sitting there in my seat.

It was Joe.

Warbucks had given Joe the other half of the ticket. The other Kerran at the diner had been Warbucks' boss, and had cancelled the trip to China. Joe had tried to get in touch with me before leaving for the spaceport, and had transferred all his savings into my account before he left. We both had a laugh over that. No matter, we would get all our savings back eventually, both his and mine. It would amount to a small fortune back on Earth.

When Joe and I were both prisoners trying to escape, there was no point in getting too entangled with each other, but now that we were both free, all bets were off. During the long trip, we talked about buying a restaurant or maybe a limousine service together when we got back home. ■

FOR C.S. LEWIS ON HIS 101st BIRTHDAY

CS. Lewis is one of my two favorite writers. Throw Heinlein into the mix, and you have them both. This is not going to be some kind of compare-and-contrast essay, however. I like Lewis for the reasons I like Lewis, and Heinlein for the reasons I like Heinlein. I can't say I've ever thought about what similarities there are between the two, other than that both were masters of the craft.

About a year ago as you read this, there was a celebration in some circles of C. S. Lewis' hundredth birthday. I missed mentioning anything about it, but in the spirit of those who intend to celebrate the dawn of the new millennium in 2001 rather than 2000 (and thus miss the best parties), I'll try to make up for it now.

C. S. Lewis is familiar to most of his readers through the *Chronicles of Narnia*. Every few years I dig out my set and reread all of them, and of the seven that make up the series, my favorite is *The Silver Chair*. This series is often wrongly called an allegory of the Christian Gospels. It is not. It is an alternate world fantasy in which Lewis described a redemption story as it might have occurred in a fantasy world called Narnia (and then only in the first volume).

Among SF fans, Lewis might also be known for his "Space Trilogy." Actually, I find this rather unfortunate. Having

been thoroughly delighted by the Narnia tales, I found the "Space" novels disappointing. *Out of the Silent Planet* was dull, and *Perelandra* tedious (though it has far and away the most *interesting* pre-space age Venus I've ever encountered). But I did enjoy *That Hideous Strength* despite it's not being set in space at all. In some ways this last book is also the creepiest novel I've ever read.

So of Lewis' major works of fiction, one series was a big hit with me, and the other pretty much a miss. So why is he such a favorite?

Lewis is also known for his nonfiction, and it is here that he shines his brightest. In these works one will find a genuinely wise man, and a Christian apologist speaking as an apologist should. Everybody should read Lewis' *Mere Christianity* even if for no other reason than to be exposed to the sort of Christian thinking that used to be common before the era of TV ministries. (This is not to say that all of those are bad—but the godawful ones are the most memorable.)

I'm not going to launch my own article on Christian apologetics—my own particular Protestant denomination is in such sad shape that I just don't have the stomach for it anyway. But I did want to cover a bit of "the Lewis story" by way of introducing you readers to some of

Lewis' shorter essays, for among these one finds many treasures.

It is these essays that make Lewis such a favorite of mine, for the wisdom contained therein is so succinctly laid out, and so applicable to life in general apart from religion, that I keep coming back to them time and again.

There are two short essays in particular that have been much on my mind of late. One is called "On the Reading of Old Books" and the other "Bulverism." Both essays can be found rather easily if you search out the Lewis canon at the library or the bookstore. Any Christian or "family" bookstore will surely have C. S. Lewis in stock. My copies of the essays are contained in a collection called *God in the Dock*.

A few columns ago I wrote about my work on the Marinov Motor. That work continues. Since it is clear to me that the "problem" of the Marinov Motor is intimately linked with the problem of the Faraday disk and unipolar induction in general, this last year has sent me to the library to find what others have had to say on these issues. Textbooks are a mixed bag in this area. In general, the more modern the textbook, the less useful it is, for foundational problems in classical electrodynamics are simply not where the money is these days.

This is not to say that all of the old textbooks are good ones. Far from it; the past had its share of awful writers and cut-rate physicists. But usually, the best of the lot from the old days survive into the present, and these are often the books written by the old masters. I particularly like Sommerfeld's lecture series, especially his book on electrodynamics. It has exceptionally useful material dealing with unipolar induction.

The other advantage is that Sommerfeld was a genius. This is one of the two major points that C. S. Lewis makes in his essay. Lewis decried the idea common in his and our time, that to, say, study Plato, one might best go to a book about what Plato said, rather than to

take a good translation of Plato off the shelf and see what the man had to say on his own, unfiltered by others. Lewis makes the point that Plato, by virtue of having such a fine mind, is usually much easier to understand than almost any of the people who write the books about what Plato said.

The second point Lewis makes in this essay is that, though the writers of the old books made just as many mistakes in their thinking as we do today, they tended to make *different* mistakes, and this can tell us a lot. You can read a book from just before the (American) Civil War and note immediately the background notions about slavery that are absolutely abhorrent to us today. Or consider how quaint the sexual mores of only a few scant decades appear in books written then, compared with what one reads in an ordinary novel today—hell, even some of the stories that appear in *Analog*.

From my own experience with Sommerfeld and other old physics books, one notes that books written recently take a great deal for granted that was not taken for granted in the past, and this is not always because more research made anyone any surer of the accepted truths. In many cases, a guy like Sommerfeld would have said something like: "It is accepted practice to use such-and-so approach, assuming this-and-that..." A modern book might say: "We do it this way" without noting which assumptions have gone into the mix, if the author was even aware of them.

I should note that this essay "On the Reading of Old Books" was written as an introduction to a book on St. Athanasius, so the relevant wisdom is contained in morsels spread throughout the essay.

The essay on Bulverism was delivered as a speech to the Socratic Club. It cuts off near the end with Lewis' words and is continued as a few notes taken by someone listening to the talk. And yet, this particular essay nails down the most

common "philosophical" problem of today that I can think of (the subtitle for the essay is "The Foundation of 20th Century Thought").

What is Bulverism? Well, it's that view that any opinion that anyone has about anything can be pinned to something other than arriving at that opinion via study and logic. Any husband who has heard his wife say (or vice versa) "You're only saying that because you're a man!" has been on the receiving end of the Bulveristic argument.

This is a very powerful argument, as Lewis discusses in detail. Reason cannot prevail against it. We just went through the spectacle of the impeachment of Bill Clinton. Were not the accusers daily excoriated for being partisan, for pursuing the president solely for political reasons, and not because the president had perhaps done something that they honestly felt merited an impeachment inquiry? But the knife cuts both ways, of course. Were not the president's defenders also put on the receiving end of Bulverism? Were they not also excoriated, though in different quarters, for being nothing more than shills for the Administration—paid liars, entirely insincere in the views they daily espoused on TV? (Yes, I know, some on both sides were guilty of just these things—but not all of them.)

Bulverism is a marvelous argument technique, exceptionally efficient. Why waste time learning and thinking so that you can refute an argument on the merits when it is much easier to just accuse someone of only holding a particular view because of some other completely superficial reason?

The deepest beauty of the Bulveristic approach can be found when one applies it to oneself. It becomes possible to gain exoneration for wrong views and bad behavior by asserting that some extraneous factor was really at work. This is fantastic! Now, one not only doesn't have to learn and think so that one can refute some other person's ideas, one doesn't even have to learn and think to

have any of his own opinions. Why bother when no matter what your views, you hold them because you're a product or victim of your upbringing, or your race, or your addictions?

You get the point. What's scariest is that Lewis pointed all this out years ago, and the idea, if not the name, of Bulverism predates him. And yet, society continued and continues to use this philosophy without even noticing that it's the one that's being used.

Now, since Lewis was much wiser and a better writer than I am, I suggest you stop reading me discussing Lewis, and go read the man himself.

On the personal front, a bit of good news on my end. I've got a new job.

Perhaps some of you have noticed the lack of science fiction with my name attached to it appearing in *Analog* since I took over this column. There is no cause and effect at work here, though. Taking over *The Alternate View* coincided with the birth of my son. That gave me three kids, none of them older than four. It also coincided with my work on the Marinov Motor which I discussed some months ago. This ate up all of the spare time I had for writing fiction since I still had my day job to deal with.

But all of that's changed now. Gene Mallove at *Infinite Energy Magazine* has hired me to be both Associate Editor of the magazine and to be a research scientist in the onsite New Energy Research Laboratory. In other words, I'm now being paid to do what I had previously been scrimping time together to do for free out of sheer love for the work.

So as I write this, the house is in total disarray as my wife and I prepare for the big move to New Hampshire. I may skip a column during the more hectic parts of my schedule, but now that half of my previous distractions are now my job, I think you can expect to see more fiction coming from me in the coming months. ■

“I can do better than that,” Brian Plante told himself after reading a particularly bad story. It is a fact of life that an editor has to fill an issue and sometimes there aren't enough good stories on hand. Editors are always looking for good stories, and cherish contributors who consistently turn in first-class material. This magazine's editors have a tradition of spotting talent and working to develop it.

The legendary Lester Del Rey started writing the same way as Brian. “I can do better than that,” he said to his girlfriend more than fifty years ago. Brian's literary epiphany didn't occur until he was in his mid-thirties. His first *Analog* story “True Blue” appeared in January 1997.

Unlike writers of Lester's era, Brian picked up encouragement from SF writing instruction. The idea for “True Blue” came from a classroom exercise and was workshopped at a *Writers of the Future* seminar. The year before, he had been a winner in the 1994 WOF contest. His entry appeared in Volume XI of the WOF anthologies. Brian's second *Analog* story was named best short story in the *Anlab*.

Brian started reading SF at ten, and grew up entranced by technological marvels sprouting up all around. Seeing real rockets go to the moon on TV as a kid, and attention-getting *whiz-bangs* at the 1964-65 World's Fair in New York, he got the idea early that SF was the literature of today and tomorrow. More thoughtful than most youths, he went back and read a lot of the earlier SF, unconsciously preparing himself to be a writer aware of what went on before so that he wouldn't be treading on well-worn ruts. He collects “best of the year” anthologies and keeps abreast of new stories, too.



Brian Plante

Brian believes that the quality of writing is better than ever. What remains the same is a wide-eyed look at what's happening in the evolution of Western Civilization and a perceptive skepticism that translates into “what if” glimpses of possible futures. Fred Pohl's notation is still true that what you say in SF is more important than how you say it, only now you have to say it better than before.

Brian was born and raised on Staten Island, a ferry ride away from the skyscrapered metropolis that was the original pressure cooker which transformed the world with the financing of newer and bigger enterprises, advertising and marketing, communications, theater, literature, and expectation of futurity where things will never again be the same. A degree came for New York University in pre-med courses that covered the basic sciences.

(Continued on p. 142)

Ron Goulart



I MARRIED A ROBOT

*The best-laid plans
sometimes get a little rushed. . . .*

Illustration by Kelly Freas

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It wasn't exactly her husband who arrived in the sturdy neowood packing case.

What it appeared to be, once Maggie Quincade used an electric crowbar to pry the lid off the case that had just been delivered to her beachfront condo in the Malibu Sector of Greater Los Angeles, was a robot. A big, about six and a half feet tall and impressively wide, chrome-plated robot stretched out on his back with his hefty metal arms stiff at his sides and his silvery metallic eyelids tight shut.

"What the hell is this?" Maggie inquired aloud. "I didn't order a huge, ugly Guardbot—and I can't think of anyone dippy enough to send me one as a gift."

She was a slim pretty woman, dark-haired and thirty-one. At the moment, she was wearing a short sinsilk nightie and a short nurayon robe. Bending from the waist, Maggie squinted in at the bulky bot. She reached and, gingerly, tapped the mechanical man on his broad chest.

That produced a hollow bonging sound.

Then the robot muttered, "Gurk," and his right arm made a faint ratcheting sound as it swung a few inches upward.

Clutched in the thick silvery fingers was a subpaper booklet entitled *Your Botz, Inc. Guardbot Operational Manual*.

Maggie made a negative gesture with both hands. "Thanks, no. I'm not interested in operating a big lumbering nitwit of a machine. Obviously you've been shipped to the wrong. . ."

A note fluttered free of the reclining mechanism's upraised hand, landing on his silvery midsection.

After inhaling and exhaling in a moderately annoyed way, Maggie reluctantly plucked up the note and unfolded it.

In a font she didn't recognize, the note said—*Ben wanted you to have this in the event of his death. Activate the bot and he'll explain everything. Well, actually, it wasn't supposed to be one of our Botz, Inc. Guardbots, but the timing was all off and this is the best I can do. Take care and my deepest sympathies. Ira.*

"Ben's not dead," she said, taking a step back from the crate that sat there on her new thermocarpet.

Actually Maggie wasn't absolutely certain her husband wasn't deceased. Since they'd separated five months ago she'd seen him once in person and twice on the phone. She hadn't had any communication from him at all in nearly a week.

Maggie eased forward again, eyeing the supine robot. "Ben faxed me some ad copy at our agency last week, but that was five or six days ago," she said to herself. "So, theoretically he could've kicked off since then."

But, no, that didn't make much sense. Their advertising agency was well-known.

Maggie leaned her buttocks against the edge of the case and took another look at the bulky Guardbot. "If one of the partners of Quincade & Quincade Advertising had died, it'd be in all the faxpapers and on the vidwall news and the netsheets and. . ." She trailed off, sniffing.

Surprisingly, she found she was crying.

"Jesus, why am I getting sentimental over that meanminded, immoral, philandering son of a bitch?"

"Gurk," murmured the bot once again.

"All right, OK." She pulled the manual free of the mechanical man's grip.

After scanning the opening pages of the section titled *Congratulations On Owning The Best Bot For The Buck*, Maggie tossed the booklet over atop her new floating plasglaz coffee table and knelt beside the crate.

"Where the heck is Button A-6?"

When she lifted the robot's left arm, it made a raspy creaking noise.

"Didn't they oil this thing at the darn factory?"

Button A-6 was in the chrome-plated armpit, along with B-2 and C-8.

Maggie sighed again, pushed A-6 twice, B-2 once and C-8 three times.

As the big bot groaned and sat up,

Maggie jumped back and away from the crate.

"You sure took long enough to get me up and running, Mag," the robot told her.

She frowned. The voice coming out of the mechanical man's voxgrid was that of Ben Quincade. "How come your voice has that distinctive nasal twang when you don't have a nose?"

"Of course I've got a damn nose." He swung up a metal hand to locate the nose on his face. He, instead, whapped himself on his prominent metal chin.

"Well, yes there's a little button of a nose," she conceded. "But nothing like the Roman schnoz you . . . Hey, wait now. How come you're talking with Ben's voice at all?"

He located his nose, felt it. Then he poked and prodded his torso. "Shit, I'm dead," he realized. "Yeah, that's it. They succeeded in knocking me off. But Ira was supposed to install the—"

"Ira Tandofsky, your buddy at Botz, Inc. over in the Laguna Sector?"

"That Ira, yeah."

Maggie, eyes narrowed, was studying the robot's rather blank face. "What did Ira do? Make a download copy of your nitwit brain on a silchip and stick it in this bot's coco?"

"Well, that wasn't the original deal, no. You're right about the brain chip, but I didn't expect to end up a Guardbot." He held up his metal hands, studied them for a moment, shook his head. "But I am definitely one."

"And you were expecting to be what?"

"An android dupe of myself, obviously," answered Ben. "Well, no, I was basically hoping to live into my eighties at least and keep inhabiting my original body. After all, I exercise regularly, eat a sensible vegan diet and—"

"It was probably all the tomcatting around you did that wore you down, Ben."

He held up a single silvery finger. "One little affair, Mag," he said. "And a fleeting one at that, yet you—"

"Fleeting? Two and a half weeks in a houseboat moored off the San Pedro Sector is your nitwit idea of fleeting?" Hands on hips, she scowled at the robot. "And what about that other bimbo who has that condo up in the Cold Water Canyon Sector of GLA?"

"Mavis? C'mon, I was just teaching her how to play flamenco guitar. You're so violently jealous that you misinterpreted the—"

"Oh, so? I suppose that tapdancer you rendezvoused with in that orbiting motel satellite was—"

"We used Denise in those commercials we produced for Foodz, remember? That was purely and simply—"

"Never mind," cut in his estranged wife. "Just explain to me how come you've intruded into my private life. We're officially separated, Ben."

"Hey, don't you have any heart left? I'm dead and—"

"Bullshit, who says you're dead?"

"Boy, it's just like old times again," complained the robot. "You'll argue about anything, Maggie. If I'm not dead, then why did Ira install the copy of my brain in this bot?"

"That's exactly what I'm wondering."

Slowly, swaying some, the chrome-plated robot rose up and then stepped clear of the crate. Glancing down at himself, Ben observed, "Damn, I don't have any private parts."

"Good," said his wife.

"See, I still don't understand why Ira didn't install the copy of my brain in the android replica of my body he was constructing at Botz, Inc.."

"Not enough time."

"How do you know that?"

She handed him the note. "Says so here."

After reading the message twice, Ben said, "I'm going to have to contact Ira and find out why in the hell he—"

"Just tell him to send a skyvan to haul you and that damn crate out of here."

"No, we don't want to do that," he warned. "Because if I'm dead, then you

may be in danger, too. That's why I instructed Ira to ship me here after I got killed. So I could warn you."

"Why didn't you warn me before you were dead—if you actually are dead?"

"You know how you are, Mag—you would've panicked. And I wasn't absolutely sure that—"

"And in danger from whom?"

When the big robot shook his head, it produced a creaking noise. "Now that you mention it, Mag . . . I don't know," Ben admitted.

"You're walking around as a robot and are even more unsightly than in your previous format," said his wife, scrutinizing him through narrowed eyes, "and you have no notion what you were afraid of?"

There were a few more bonging sounds when he tapped the side of his skull. "This is odd," he said slowly. "I have the feeling that I did know."

"OK, fine. So tell me, huh?"

"I can't seem to. I don't remember the details at all anymore," the big robot confided. "I think maybe I found out something important . . . and it has to do with our agency."

"Can robots suffer from partial amnesia?"

"It could be that Ira screwed up the brain chip when he was installing it. You know, accidentally erased some stuff."

"That seems unlikely, Ben, since he's an expert at this kind of work," said Maggie. "Your original brain, you know, wasn't all that effective. Maybe you're just having one of your memory lapses."

"I wouldn't be likely to forget two attempts on my life," he said, annoyed.

She took a step closer to the mechanical man. "See? You're remembering. What attempts on your life?"

The robot tapped the side of his head, concentrating. "When I was at the Holowrestling matches at the Burbank Sector MiniArena a week ago, somebody tried to shove me over the edge of one of the exit ramps," he said. "Yeah, if I hadn't caught onto a railing, I'd have fallen two hundred feet."

"There's a force screen to prevent that."

"It'd been turned off," he answered.

"Then four days ago, when I was power-cycling along the bikepath on the beach, somebody shot at me." He held up two shiny metal fingers. "Twice with an old-fashioned bullet-rifle."

"Who?"

His shoulders creaked when he shrugged. "No idea."

"Was that when you went around to Ira and asked him to make a download copy of your brain and get an android ready?"

"Yeah, because I was certain I was in danger," he said.

"But if you knew something important, something dangerous—why not just go to the authorities?"

"I must've had a reason, Mag. But that's another thing I can't seem to remember."

"Well, nary a soul has tried to knock me off, Ben." She backed until she was sitting on the neohide sofa. "It's possible that I'm not involved in this at all—whatever the heck this is." She shook her head. "You're a very annoying person and there are probably multitudes of irate husbands and mistreated women out in Greater Los Angeles alone who want you dead. If I weren't a humane, nonviolent person, I'd have done you in myself long ago for your infidelities alone. From the moment we shuttled back from the orbiting Episcopal Church of SoCal, you started chasing every dimwitted woman who—"

"Hold on a minute, Mag." He sat beside her and the sofa shimmied. "I still don't understand how come you didn't know I was dead."

"You're not dead," she suggested, folding her arms under her breasts. "And I'm starting to wonder if this isn't just some cheesy trick to get back into our condo. But as a bid for sympathy, it—"

"You honestly think I'd spend the remainder of my life as a Guardbot with no private parts just so I could bask in the

radiance of your venomous personality?" he inquired. "I came here to help you, Maggie. Even though you cast me—"

"What in heaven's name is going on out here, Maggie my flower?"

The door to the master bedroom had come whispering open and a large red-headed man, about the height and width of the robot, wearing a neowool nightshirt and not fully awake, emerged into the living room.

"Curt Barnum," said Ben, standing up. "I'm not even cold in my grave and my Chief Account Executive is shacking up with my wife."

Barnum glanced at Maggie, frowning. "Why does this bot have Ben's voice, sweetheart?"

"Ben, please." Maggie caught the robot's arm before he could climb over the coffee table and go charging at the husky red-haired man.

Ben was making rumbling sounds inside his metallic chest. "Of all the goons in our office, Mag," he said, "why did you pick Curt Barnum?"

"He's a very sensitive man and you've never fully appreciated him."

"Sensitive? He—"

"Can you guys fill me in?" asked Barnum, looking from Maggie to the robot. "I don't understand why this mechanism seems to have the idea that it's Ben Quincade or—"

"Go home, Curt," suggested Maggie. "This is a domestic problem and I'm afraid I'm going to have to help Ben one last time."

"What's Ben got to do with this?"

"I'm Ben." The robot bonged a fist against his chest.

Barnum shrugged. "I'll see you at the office tomorrow, Maggie flower," he said and went into the bedroom to collect his clothes.

"I may take tomorrow off," she called.

Maggie set her palm computer down atop the floating plazglass coffee table. "Well, OK, your earthly remains aren't in any of the obvious locations," she an-

nounced, leaning back in the tin arm-chair and sighing. "I ran your DNA-ID through every morgue, hospital, funeral parlor and potter's field in the country—and checked Mexico and Central America for good measure."

"I guess that's comforting." He had a panel in his chest open and was using the built-in computer he'd discovered there. "This is neat."

"You are also not incarcerated in any known penal institution, loony bin, homeless center or military base," Maggie continued. "I've tried your description with all of them, plus hotels, motels and bordellos. There looked like there was going to be a match down in the San Diego Sector, but it turned out to be a gorilla who'd escaped from the zoo."

"Better sleep with a gorilla than shack up with Curt Barnum," the robot said. "He's got shaggy legs."

"At least they aren't chromeplated."

Ben said, "I can't locate Ira Tandofsky at all. Not at his office or at home. His answering bot at both locations just plays a thirty-sec vid where he claims he's going to be out of town for an indefinite period. It's dated the day before yesterday."

"Same day he stuffed your brain chip into a leftover robot?"

Ben nodded. "Ira looked pretty agitated on the—"

"Ira is congenitally agitated. He always looks that way, Ben."

"No, this is exceptional nervousness, even for Ira. He keeps peering over his shoulder, glancing left and right, fidgeting in his chair," he explained, poking a finger into the opening. "Come over and I'll replay the message for you."

"Thank you, no. The prospect of gazing deeply into your interior doesn't appeal to me."

Ben shrugged and shut the panel. "There's something about Ira I can't quite remember."

"Something about where he is?"

"Yeah, a place he might go to lie low."

"Why exactly would Ira want to lie low?"

"They may be after him, too."

His wife stood. "Unless I want you underfoot forever, we're going to have to resolve this mess," she told him. "What say we go to your place to see if there's anything of interest there?"

"Clues, you mean?"

"Clues, receipts from motel orgies, some floozie's discarded lingerie. Stuff like that, Ben."

He rose. "That's a good constructive suggestion," he said.

"You look extremely silly," remarked Maggie.

"I'm not used," said the robot, "to running around naked."

He and the dark-haired young woman were walking down the ramp leading to the condo complex' parking/landing area. The autumn night was chill and overcast.

"Technically," she pointed out, "you can't refer to a robot as being naked."

Ben unfastened the top two buttons of the black overcoat he was wearing. One of his old ones that he'd left behind when he moved out, it was no longer a perfect fit. "Eventually I'm going to need a roomier coat."

"You have always, dear heart, had a problem accepting reality. You're a robot now, Ben, and robots aren't noted for modesty. That beret's dippy, too."

He readjusted the black beret on his chrome head. "I'm not used to going around bald either."

"Again you're being unrealistic. Robots don't have hair, hence—"

"How come Curt calls you flower?"

"It's a term of endearment, obviously. He happens to be, as I already told you, an extremely sensitive man. Also tender and poetic."

"He must be the only sensitive, tender and poetic account exec in all of Greater LA."

Maggie said, "What say we lay off my private life and just go over to your place to see what we can find out there, huh?"

"That's exactly what we're in the process of doing, Mag. Don't nag," he

said. "Eventually we're going to have to locate Ira. If he's vanished, then I may never get into my android body or— Hold on!" Ben suddenly took hold of her arm with one big metallic hand.

"Hey, it was repulsive enough being pawed by you when you were flesh and blood," she mentioned, pulling free and continuing on down the slanting plazramp. "Being fondled by robots is even less—"

"Just halt right there, Mag." The big robot trotted to her side, then pointed down at her crimson skycar some two hundred feet below them. "Now that I'm a Guardbot, you know, I've picked up a lot of terrific additional abilities."

"What this time?" she inquired. "Does it involve opening a door in your backside?"

"Well, I seem to be able to sense dangerous devices." He nodded toward vehicle. "I'm getting a message that somebody's planted a bomb in your car."

"Oh, c'mon, Ben, quit trying to play hero." She took a step forward. "Of all the dippy notions."

He caught hold of her again. "Even though you never did this during the seven long miserable years we were married, Maggie, you might try now to entertain a point of view that doesn't agree with yours."

"Eight long miserable years," she corrected.

With his free hand he tugged the Guardbot instruction manual from his overcoat pocket. "Page 232," he instructed as he thrust the book toward her.

Ignoring it, she shrugged. "OK, all right, I'll take your word for it," she said. "But why in the hell would anybody want to—"

"Hit the deck!" Ben dropped to the ramp, yanking her with him and stretching his big metal body down flat.

"What did I tell you about pawing me?" She started to struggle upright.

With a widespread metal hand he forced her down. "It's about to go off."

There came a huge whomping sound, the ground and the ramp shook.

The crimson skycar rose up into the night, not as a complete entity but in a twisted, smoking collection of parts, components and shatters of scorched red plazmetal.

"You were right," conceded his wife in a small voice. "But why?"

"That's one of the things," said the robot, "I'm trying damn hard to remember."

Traveling in a rattletrap skycab, they reached Ben's apartment at Boatown Three off the coast of the Santa Monica Sector a few minutes shy of midnight.

"Your advent," Maggie was telling the robot as the taxi settled to a wobbly landing on one of the Boatown docks, "hasn't been all that propitious."

"Here we are, folks," announced the voxbox of the cab as both passenger doors went popping open.

Maggie continued as they disembarked, "First off you scare a decent, sensitive man like Curt Barnum out into the night."

"Well, Mag, that's what often happens when you're in the sack with somebody else's wife and he comes home unexpectedly," Ben pointed out. "And I wish to hell you'd quit referring to a lout like Curt as sensitive."

"Folks," called the cab, the fare's forty-six bucks."

Maggie, making an angry noise, halted on the plazplanks of the dock. "And there's one more thing." Her nostrils flared. "I had a perfectly fine skycar until you—"

"Don't I know it was perfectly fine? The damned thing was mine until that duplicitous attorney of yours forced me to turn it over to you."

"Forty-six bucks," repeated the skycab.

"Pay him," suggested Maggie evenly.

Spreading his hands wide, Ben said, "I left my wallet on my other body."

She inhaled sharply, marched back to the cab and jabbed her Banx card into the meter slot. "Exactly forty-six bucks, asshole, and no tip," she said, tight-lipped.

"Much obliged, ma'am."

The card came popping out of the slot, Maggie caught it and the cab rose up into the midnight sky.

"And, because of you," Maggie resumed as she followed the overcoated robot along a row of moored houseboats, "I also had to devote two full hours of my life to answering halfwit questions from the SoCal State Police, the Native Californian Insurance Syndicate and at least a full dozen of my pea-brained, overly inquisitive damn neighbors." She stopped still, hands on hips. "Is this the same houseboat where you dallied with that blonde floozie?"

"Red-haired floozie." Balancing carefully, arms held out at his sides, Ben walked across the narrow gangplank from the dock to the deck of the fourteenth houseboat. "And this rundown pesthole was about all I could afford after your shyster persuaded me to bestow most of my income on you as a separation settlement and—"

"I'm hoping we'll find you—your real self, that is—inside here." Maggie made her way, gingerly, over the shimmying gangplank. "Probably in a drunken or drugged stupor. Soon as we do, I'll take my leave."

"My lifeless corpse is what we'll likely find." He stepped up to the door of the deck cabin, spoke into the voice ID box. "Avast, you lubbers, pipe me aboard."

"What an extremely dippy password."

"It came with the boat."

"Aye, aye, captain," said the door as it swung open inward.

Maggie nudged the big robot across the darkened threshold. "OK, let's make a quick search."

"Hold it," warned Ben. "Something's wrong."

"Not another bomb?"

"No, nope. I'm sensing something else." He, very carefully, entered the parlor.

"It must be very difficult for a robot to tiptoe."

"Hush." He made a rattling, throat-clearing sound. "Lights, please."

Light blossomed.

"I thought so," said Ben forlornly.

"Is she dead?"

The body of a pretty, sunbrown blonde of about thirty was sprawled on her back on an oval carpet near a plazrocker.

"This is an android." Ben was kneeling beside the body.

The mechanism's midsection had two small sooty holes burned through its tunic, sinflesh and metal undercoating. A few small gears, twists of wire and glittering little springs had spilled out, along with splashes of long-dry machine oil.

"That's Portia Talwin," recognized Maggie. "What's a defunct simulacrum of the Advertising Manager of the Serv-U, Inc. outfit doing in your place, Ben?"

When the robot stood, he creaked slightly. "Well, Portia and I—the real Portia—had become sort of friendly the past few weeks," he admitted.

"Another dame? Won't your philanthering ever cease?"

"Hey, you and I are officially separated," he reminded his wife.

Maggie was moving toward the doorway to the bedroom. "Let's see if you're around here someplace, too, Ben."

He sprinted as best he could, catching hold of her arm. "Whoa, it'll be easier if I just use some of my built-in gear," he suggested. "If I'm in any of the other rooms, I'll sense it."

"I don't know why anybody would want to show off about being a gadget."

The robot began making small whirring noises inside his broad metallic chest. His eyes flickered momentarily green. After a moment, he shook his head. "Nope, no, I'm not here. Drugged, drunk, dead or in any other condition."

"Damn. I was hoping we'd find you within a reasonable time and I could get back to the important stuff in my life again."

"Your concern is appreciated." Ben strode to a linoleum-covered sofa and sat, nodding at the defunct android. "I have no recollection of this, no memory of finding this andy here. So it either

happened after I did the brain content download with Ira or it's one more thing I've forgotten."

Maggie slowly circled the android dupe of Portia Talwin. "Whoever used a kilgun on her probably thought, at first anyway, that they were knocking off the actual Portia," she suggested. "Had she hinted to you that anybody was out to kill her, too?"

The robot frowned, struggling to remember. "Wait now, I'm getting a flash of something, Mag," he told his wife. "Yeah, this whole mess has to do with Portia. She's involved with it."

Maggie lowered herself into the plazrocker and eyed her husband. "Well, that's obvious, isn't it? The poor woman—or a reasonable facsimile—is lying dead in your darn parlor, Ben."

He drummed on one metallic knee with his metallic fingers, producing little ponging sounds. "Seeing Portia, it's triggered some memories. But shit, they're vague," he said. "It occurs to me that maybe she confided in me about some trouble at Serv-U—something crooked they were up to with those robot servants and housekeepers they manufacture."

"Such as?"

"I can't dredge that up yet." His fingers tapped again on his knee. "Could be, though, that it was something to do with Trevor Rawls."

"The CEO of Serv-U?" She stood suddenly up, causing the rocker to tick back and forth. "Don't go making trouble for him or we'll lose the account. That bills twenty-one million dollars a year for us, remember? Rawls is such a nasty guy, he'd dump our ad agency for a lot less than accusing him of attempted murder."

"Just thought of something." Ben rose, went lumbering across his parlor.

He crossed into the small bedroom and opened a closet.

"Now what?" Following, Maggie watched him poke around inside the closet, using the lightbeam built into his right thumb for illumination.

"My two neohyde suitcases aren't here."

"You figure you deliberately took off then? Packed and went someplace to hide?"

"Seems possible," he acknowledged. "Thing is, where the hell did I go?"

"I was hoping you two folks could tell me that." A large blond man was smiling in at them, framed in the bedroom doorway. He was a cyborg and his coppery right hand had a kilgun built into it.

The forefinger that formed the barrel was pointing at Maggie.

"Some Guardbot you turned out to be," accused Maggie, glaring across at Ben.

"Hey, I've only been a damn robot for ... what? ... a few hours."

"So typical of you." She took two steps back away from him. "You seem to have an excuse for every darn—"

"C'mon, folks," cut in the cyborg intruder, gesturing with his gunhand. "We had this dump bugged, so we'd know if anybody came nosing—"

"Oh, go ahead and shoot him," invited Maggie, increasing the distance between her and the robot version of her husband. "He's supposed to have all sorts of built-in warning devices, yet he lets a flatfooted oaf sneak up on us and doesn't even—"

"I'm not exactly flatfooted, lady," contradicted the cyborg. "Fact is, ma'am, that before I became a thug I was rising in the SoCal Community Modern Dance Troupe and was noted for—"

"If you hadn't been blathering," Ben told Maggie as he backed further from her and nearer the thug, "I'd have been better able to monitor my sensors."

"Oh, sure, blame me for you darn failings." Turning her back on him, she started striding toward the door to the bathroom.

"Hold it, lady. I'll have to shoot you if—"

"Now!" Maggie dived for the thermo-carpeted floor.

Ben, while the gunman was momentarily distracted, lunged for him.

Before the husky blond man could swing his gunhand around to fire at the charging bot, Ben was right there.

The robot hit him twice, hard, on the jaw with his big metallic right fist.

"Oof," remarked the gunman as he went slamming back against the bedroom wall.

He folded up in the middle, blond head rocking forward. Then he went slumping into a lopsided sprawl and passed into temporary oblivion.

Maggie laughed. "Well, you're not as dense as I thought," she said.

Ben eyed her, then knelt next to the fallen intruder. "Nope, I recognize a diversion when I see one, darling."

She joined him, frowning down at the blond cyborg. "We make a pretty good team actually," she admitted. "Do you know this goon?"

"No, nope. And he hasn't got any ID material on him." The robot shook his chrome-plated head. "I'm going to have to use some of my interrogation gear."

She glanced toward the doorway to the parlor. "Better do it swiftly, Ben," she advised. "They're sure to send more louts to replace this one."

Nodding, he yanked the unconscious thug up off the floor and tossed him into the nearest chair.

Leaning back in the passenger seat of the climbing black skycar, Maggie conceded, "OK, you didn't do badly."

"Keep in mind that I've never given anybody an injection of Trutok before." He was occupying the driveseat. "And I did manage to swipe the guy's skycar without a hitch."

"Well, yes, true," his wife admitted. "But I couldn't help feeling a mite uneasy when you had to stop midway through the hijacking to double-check the details on how to do it in the Guardbot instruction book."

"Better safe than sorry."

Maggie asked, "And you're sure we're heading for the right destination?"

"Yep. When that thug mentioned that they'd tracked the real Portia as far as the Ensenada Sector and then lost the trail, it jogged my chip."

The borrowed skycar was heading south through the night, the lights of Greater Los Angeles ten thousand feet below.

Maggie, arms folded under her breasts, said, "That was impressive when you exclaimed, 'Eureka!' and whapped your forehead."

"It was an important moment, when I remembered that Ira has a hideaway down in Ensenada."

"But that's Ira, not Portia."

"No, they've got to be in cahoots in some way," said the robot. "That explains the gaps in my memory."

"Um," she said, not exactly agreeing.

The skycar continued quietly southward.

She finally said, "Curt can help us."

"In what possible manner, for God's sake?"

"Well, we're up to here in a mess, Ben, in case it hasn't occurred to you."

"It has," the robot said. "The guy who runs one of our biggest agency accounts is also behind the efforts to kill me. So we have to figure out how to expose him without annoying too many other people up at Serv-U."

"Of course, that thug might've been wrong about Trevor Rawls working secretly for a group of very conservative vigilantes who—"

"Not just Rawls, but other execs up there," put in Ben. "Right now we don't even know how many are involved. All we've got is the fact that some of their top tech people have worked out a special type of servo—one that can be instructed to do a little assassination work on the side. You plant one in the home of one of the people on this groups' shit list and it goes to work. It looks like a regular, ordinary cleaning bot, cooking bot, something like that. Slips in by security and takes care of the enemy."

"If only Portia hadn't confided in you."

"Well, she did confide in me and they found out about it. That explains the attempts on my life—and maybe the fact that I seem to have vanished from the face of the Earth," he said. "And, according to our thug, there are a dozen of these special servos all ready to be shipped out. We've got to stop that."

"Certainly, ninny," said his wife. "But we don't have to do it directly. I'm betting that everybody at the top of Serv-U isn't involved in this. Once Rawls and his cronies are ousted, we want the survivors to think our agency is still a swell outfit."

"Agreed, but how does sensitive Curt fit in?"

"His ex-wife's an Investigative Anchor with Newz," explained Maggie. "We'll get her the information, let her break the story worldwide. That'll stop the assassinations but not draw undue attention to Quincade & Quincade."

"I thought his former wife was an electronic accordion player with a pacifist marching band."

"That's a different ex-wife. This one, trust me, works for Newz."

"How come such a sensitive guy has so many former wives?"

"Two isn't a large quantity."

He nodded at the control dash. "We'll be there in about five minutes, Mag."

"OK, so let's," she suggested, "work out a foolproof plan."

The robot shivered. "I'd have preferred a plan that," he said as he and Maggie made their way along the brightly lit Ensenada Sector street, "didn't call for me to wander around jaybird naked."

"We've already gone over what's proper attire for a robot and what isn't," she reminded. "You're still having a big problem—and let's face it, this is one of the main reasons we parted—admitting that I'm smarter than you. Especially when it comes to strategy."

"And you're still harboring the cockeyed notion that your intelligence equals mine."

A Border Patrol sky-car, shaped like a huge piñata and brightly colored, flew swiftly overhead in the direction of the Borderland Strip.

"Look, since you suspect that Ira and Portia may be holed up in an underground villa beneath this secondhand robot sales lot that Ira's cousin Lupita runs down here—well, the best way to approach the place is by pretending to be somebody who wants to unload a robot. And normal everyday robots don't wear overcoats and berets."

"OK, but the whole plan strikes me as lacking in subtlety."

"We don't have time for subtlety, dear." Maggie was wearing his overcoat and beret, plus a low-cost blonde wig.

"Your disguise isn't all that convincing either."

"What do you expect from a wig purchased at a shop that calls itself the 24-Hour Tourist Trap? Besides, Lupita's never seen me."

"With all my built-in accessories, I could've worked out a better way of approaching the problem."

Maggie took hold of his arm. "There's Loco Lupita's Used Bot Lot up ahead. Try to look used."

The lot was covered by a huge see-through plazglass dome and stretched across almost an acre of close-cropped neograss. There were a hundred or more robots in lopsided rows lined up on the grounds, plus a few dented android butlers, a grey-haired nanny sim and a wheeled wetbar servo. Floating above the dome was a large litesign announcing *We Got Your Bot!* There were no customers to be seen.

"*Buenas noches*," said the smiling young woman who came hurrying out of the neowood office to greet them as they stepped through the entryway. "You didn't buy that rattletrap bot off me, did you? No, *no es posible*."

Maggie whispered to Ben, "Is this her?"

He nodded. "I happen to be," he told the approaching Lupita, "a topflight example of the robotic arts."

Ignoring him, Lupita eased closer to Maggie, frowning. "You're not intending to try to sell this pile of junk to me, are you?"

"Well, yes, I'd like to see how much I can get for it."

Lupita came striding over, kicked the robot in the left knee.

His leg bonged and he said, "Ow."

"Shoddy construction." Lupita made a disdainful face, shook her head. "But then most Guardbot products are shoddy."

"Shoddy, my ass," said Ben, angry. "And how can you criticize a product made by a company your own cousin works for? I'm a near-mint example of—"

"How come you know about my cousin, *amigo*?"

Maggie suggested, "Let's go into your office and talk this over. I'm sure we can make a deal."

"No, I think I better alert . . . awk!"

Ben had used the stungun built into his left forefinger on the suspicious lot owner. Then he trotted forward, catching the unconscious woman just as she began to totter. Slipping a metal arm around her, he carried Lupita into her office.

"Your vanity's going to be the ruin of you," warned Maggie, following him inside. "And me, too, more than likely."

"You never could tell the difference between healthy self-esteem and narcissism, Mag." After placing Lupita face down across her neowood desk, he glanced around the small office.

"They must have security cams hereabouts," reminded Maggie. "So your up and stunning her out in the open is going to bring down—"

"I disabled all those before I shot her," he said.

"How'd you do that?"

"It's another built-in knack. Involves sonics."

"And what are you sensing about this alleged concealed villa?"

The robot genuflected and tapped several of the plaztile squares. "There's an entry ramp right below this movable section of the floor," he answered.

"Who's down there?"

"No guards," he said after a few seconds. "Only Portia and Ira and . . ."

"And who?"

"Well, I seem to be down there in the villa with them," he said quietly.

"Is that a standard Guardbot function?" Maggie inquired as they descended the ramp leading to the main corridor of the underground hideaway.

"Dismantling the security system electronically, you mean?"

"That, yes. Is it?"

The robot answered, "I think I've been able to modify myself somewhat since becoming a bot."

"I'm glad to see you're adjusting so well," observed his wife. "In your human days you complained about all sorts of minor—"

"Silence from here on," he cautioned in a tinny whisper. "They're in the room up ahead on the left—the one with the simulated oaken door."

"That includes you?"

He nodded. He motioned Maggie to stay back, then, slowing his pace, he approached the door.

The robot hunched his shoulders and pointed his right hand at the door's lock mechanism. From his middle finger shot a beam of sizzling, greenish light.

Shimmering, the lock ceased to be.

Ben grunted and went charging forward to slam the door hard with his metallic left shoulder.

As the door popped open inward, he dove over the threshold and, in a crouch, charged into the room beyond.

Maggie followed cautiously in his wake. When she looked into the large living room, she saw the robot standing wide-legged in the middle of an oval thermorug. He had his right hand pointing at a blonde woman who was apparently the true Portia Talwin.

Portia was scowling at the bot and blowing on the fingers of her right hand. A coppery kilgun lay on the plaztiles near her booted feet. "You could've fried my fingers, you dumbbell," she complained.

"No, he's a crack shot," said the lean Ira Tandofsky. "That's a standard feature of all our Guardbots." He was tied in a tin rocker with plazcord.

And tied to a rubberoid Morris chair was Ben Quincade. "Maggie," he said, grinning. "I didn't expect you'd come to my rescue, hon. It's great that you still care enough to—"

"What did I tell you about calling me, 'hon'? Especially in public."

"Listen, I'm really pleased that you—"

"Could we," cut in the robot, "start getting this mess untangled, folks?"

Ben, the actual Ben, frowned at the robot. "You must be my simulacrum," he realized. "Jesus, Ira, I know you told me you were rushed, but—"

"Let's quit the chitchat." Maggie walked over to scoop up the fallen kilgun. "And instead explain why you're shackled up here with this prune-faced bimbo who—"

"If you had the sex appeal of an avocado," suggested Portia, "he wouldn't have dumped you."

"He didn't dump me—I dumped him."

"He's actually not shackled up here. It's obvious the guy's a prisoner," pointed out the robot. "Now, Ben, what's been going on?"

"Portia came to me some days back, very unsettled, to tell me that Serv-U had this plan to use servos for political assassinations," he began. "Trevor Rawls was behind it. She wanted me to help her get what she'd uncovered to a reliable government agency without her being directly—"

"We know about most of that already," said Maggie, impatient. "Tell us why they were trying to kill you."

Ben answered, "Well, they found out that Portia had confided in me."

"How'd they learn about that?" asked the bot.

"You ought to know about that," Ben said, "since you have a copy of my brain in your noggin."

"There are some lapses in my memory."

Ben frowned at Ira. "How'd that happen?"

Ira looked up at he beamed ceiling. "I was in a real rush installing the chip, — Ben, and I guess I mishandled it."

"Why the rush?" asked the bot.

"When I thought he was dead, I went ahead with his instructions," explained the tech. "But then I began to suspect that Rawls and his goons knew about me, too. I couldn't wait until the android sim of Ben was finished, so I made do with a Guardbot that was handy. I shipped him to you, as Ben had instructed, and took off for here to hide out."

"See, hon, I was thinking of you at the end."

"But how come you didn't end? And why'd Ira think you had?"

Ben made a partial shrug. "I hate to admit this, but I got a little edgy after the third attempt on my life so I decided to hide out at a little place of Portia's in the Coronado Sector. When he ceased hearing from me, Ira got the notion I'd been bumped off. The thing was—"

"Ben didn't know," picked up Portia, "that I'd been thinking over everything and concluded that it would be much smarter to blackmail Rawls instead of blowing the whistle on his scheme. Government congratulations as opposed to a million bucks or more."

"So when I showed up and wasn't especially eager to go along with that new plan of hers—she stungunned me," said Ben, frowning over at the blonde. "That was to keep me quiet."

"Then she broke in here," said Ira, "because Ben had mentioned it once as a safe place to lie low. Portia bribed my duplicitous cousin, which wasn't that hard to do apparently. But what can you expect from somebody who makes her living schlepping secondhand robots?"

"And," said Ben, "Portia's been holding us here while she works out a deal with Rawls. And, of course, his people are trying to find her and knock her off—and us, too, I figure."

Maggie shook her head, looking from her real husband to the scowling Portia. "What about the defunct dupe of this floozie we found in your tacky residence?"

Ben said, "She sent the sim there—most upper-level execs have sims of themselves to handle donkey work jobs—to see if I'd left anything behind that might have to do with the Serv-U plot or where she was hiding us out."

"One of Rawls goons spotted the android there and, thinking it was really me, shot it," said Portia.

"Are you following all this so far, sweetheart?" Ben asked his wife.

"As much as I want to, sure."

"It would still be much smarter," suggested Portia, "to let Rawls pay us to keep quiet. They go ahead and kill a few useless politicians and business people and we get maybe two million."

"Nope, we won't bother with blackmail." Maggie tapped the robot on the arm. "Watch everybody while I make a call to Curt Barnum."

Her husband asked, "Why are you phoning that nitwit?"

She replied, "He's going to help us break this story."

"OK, if that's what you want to do," said Ben. "But untie us, huh?"

"After I make the call."

He watched her as she crossed to the vidphone that sat on the floating neo-wood coffee table. "You came searching for me, risked your life to find me," Ben told her. "That's a sure sign that you're still fond of me, Mag. We're still business partners and it seems to me that we ought to try to be a couple again, too."

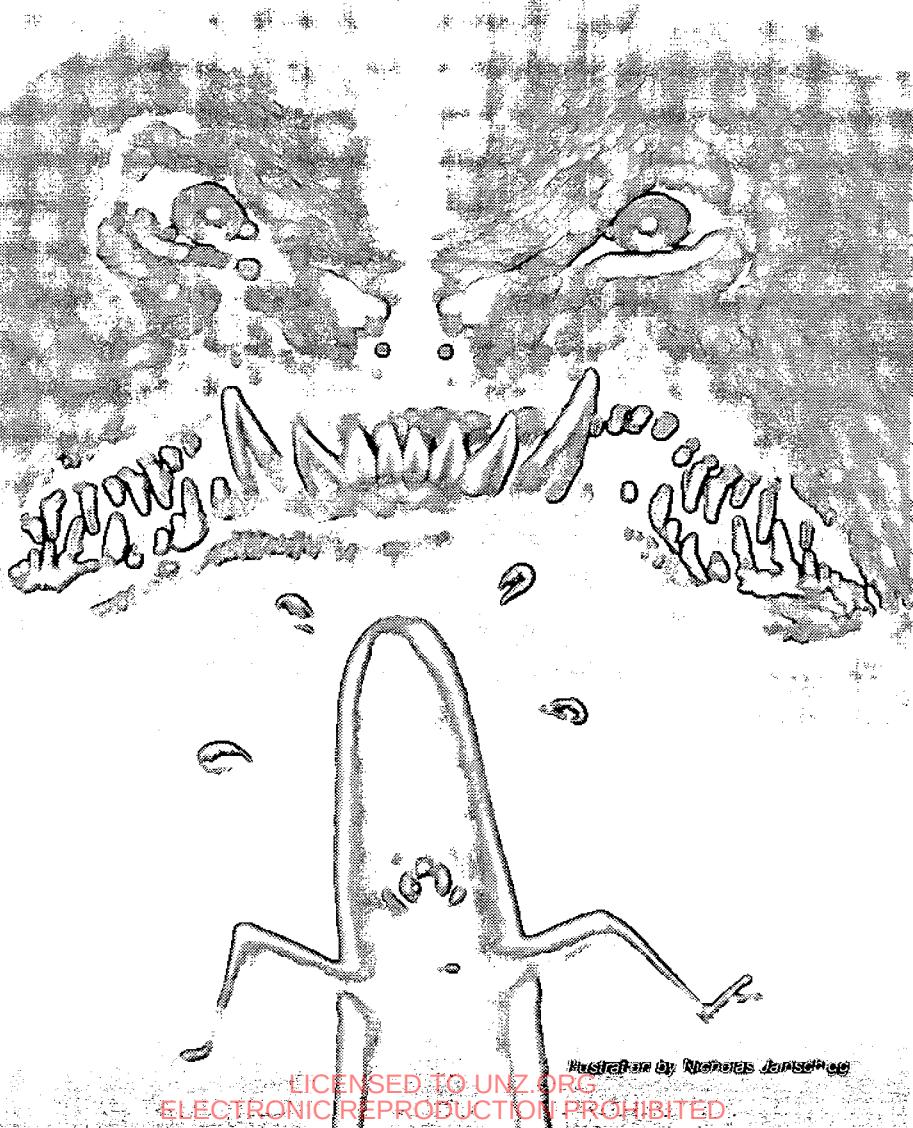
Maggie gave him a sympathetic smile. "Afraid not, hon," she said, picking up the receiver. "But if nobody minds—I would like to keep the robot." ■

Grey Rollins

FOOD FOR THOUGHT

*Fair warning: Some of this story's subject matter
is not for the squeamish.*

But it is handled . . . er . . . tastefully . . .



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Martin Crofts suffers from variable intelligence. His I.Q. varies in inverse proportion to the nearest woman's bust measurement. In some contrary way, his malady relates to the survival of his species. Judging from the fact that humans are so prolific, the strategy must work, in spite of the fact that nature usually selects for higher intelligence.

Somewhere in Marie's Italian ancestry, the random shuffling of genes had produced a line of women uniquely suited for bringing men's minds to a near standstill. Given her effect on Martin, I suspect that I could advance a more cynical explanation for the fall of Rome than the one usually found in textbooks.

The topic under discussion at the moment was a great deal less weighty than the dissolution of nations. Marie, brandishing a wooden spoon, was inquiring of Martin whether he thought the garlic bread was spicy enough. His reply was unintelligible due to the fact that his mouth was full.

He made an elaborate show of gulping down the sample she had just fed him. "Could you spread a little bit more garlic butter on it?"

She tore off another portion from the fresh-baked loaf of bread and dunked it directly into the melted butter. "Try this."

She bent over to pop the morsel into Martin's mouth, inadvertently—or perhaps not—giving him another view of that which was melting his mind as surely as the stove was melting the butter. I've heard it said that the way to a man's heart is through his stomach. Perhaps so, but eyes are nearly as effective and Marie was taking no chances, she was hitting him high and low.

He let out a contented sigh. "Heaven . . . definitely heaven. If I were the marrying type, I'd—"

She wagged the wooden spoon at him. "Don't even start, buster! You haven't got the guts to marry me."

Martin adopted an air of wounded pride. "But—"

She cast a jaundiced eye upon him. "Your protestations of innocence fall upon deaf ears."

"Marie," I put in, "if he's not the marrying type, why do you waste your time on him?"

She gave me a saucy grin. "'Cause he's a *great* kisser . . . and I also happen to be a bit fond of you, Victor."

I pulled myself up to my full height, all three feet of it, and said to Martin, "*Ha!* See? I'm more than a walking garbage disposal."

Martin glared at her. "Now, you've gone and inflated his ego—if we don't tie him down, he'll float away on the evening breeze like a hot air balloon."

She patted him on the cheek. "You're just jealous because I said Victor's cute."

"You didn't say he was cute. You said you were fond of him."

"I'm fond of him *because* he's cute."

"A leather banana's *cute*?" Martin protested, eyeing me with feigned distaste.

What he says is true. In one of those cosmic flukes, there is a terrestrial fruit that has nearly the same shape as me. Clearly, a case of convergent evolution; my species and bananas just happened to reach the most desirable body shape ahead of everyone else.

I was on the verge of teasing Martin about being on the wrong branch of the evolutionary tree when the phone rang.

Martin reached for the handset. "Hello? Oh, hi, Pete."

There was a lengthy pause while he listened, his thick, black eyebrows slowly gathering into a frown. "Pete, that sounds nasty."

After a few moments more, Martin hung up the phone. He said, "Well, Victor, we've got a chance to pick up a little consulting money."

I snorted. "Meaning I earn it and you spend it."

Marie gave me a sympathetic look. "Don't feel bad, Victor. It's not as though he's spending it on me."

Martin gave us a look meant to indi-

cate that we were hurting his feelings, but I knew better. His skin's thicker than that. "Well, since neither of you care to help solve a murder, I'll handle it myself." He made as though to get up.

Knowing full well that, besotted with Marie, he'd be unable to think his way out of a knock-knock joke, I padded over to the door of his apartment before he'd fully prized himself out of his chair. Martin only thinks he's a private detective. The sad reality of the matter is that I'm the brains of the outfit. He's the muscles. And the chauffeur. And the straight man for my jokes.

Just as Martin reached the door, Marie came out of the kitchen untying her apron. "I'm coming, too."

That caught him off guard. "What? Marie, this is a murder. And from what Pete was telling me, it's a grisly one."

"Perhaps you've forgotten that I work at the police department, dear. Corpses are nothing new to me."

He shrugged. "The more, the merrier."

Pete Sims works homicide cases for the police department. Out of friendship and occasional need, he tosses consulting jobs to Martin and me. Along with the walk-in cases we get, it's enough to keep the bills paid. Usually.

He waved at us as we drove up, directing Martin to park his dilapidated collection of rust behind one of several police cruisers. "Welcome to the woods," he called as we got out of the car. "I know it's hard, but try to forget that we're still within the limits of our fair city, even if that hill is all that stands between us and a splendid view of the skyscrapers. Instead, journey with me into the wild and dangerous forest, where a man may be hunted—even killed—by a predator of considerable size and strength."

Martin frowned. "Considerable size and strength? What are you talking about, Pete? There's nothing larger than a dog in the county . . . probably the whole state, for that matter."

Pete's face took on a grim look. "Then

this was one hell of a dog, my friend." He gestured us along a path that had been tramped into the tall grass by the side of the road. "The body was found by a couple of boys late this morning. It's Saturday, it's hot, and they thought it would be a nice day to cool off in the stream." He grunted. "Probably the last time they willingly set foot in these woods again."

Marie asked, "Pete, just how torn up is the body?"

He looked her over. "It's rough. I'm sure no one will think ill of you if you'd rather wait here."

She shrugged. "I'm tough."

He nodded. "Suit yourself."

There was no mistaking the scene of the crime. The late afternoon sun shone on blood in the trees—spattered on the leaves, and on the trunks up as high as a man could reach. Flies were everywhere. The ground was torn and churned, as though a tremendous battle had taken place.

I looked around, turning a complete circle as I did so, as my body is not as flexible as a human's. "Where's the body?"

"It's over . . . hey, guys, where's the body?" he demanded.

A man with a huge jaw hooked a thumb at a zippered bag. "Already in the body bag. Why?"

"'Cause I said not to move it until I got back with Victor and Martin."

"Uh, sorry. I thought you said *to* move it."

Pete shook his head slowly. "Norm, one of these days you'll manage to get me pissed. I mean *really* pissed. Not just strongly annoyed like I am right now, for instance."

Norm looked sheepish. "I'm sorry."

"I didn't ask for a character description, you prognathic lout," Pete muttered under his breath.

"So, tell me what happened," I prompted.

He pulled a small spiral notebook out of his pocket, flipped it open, and start-

ed reading. "His name was Carl Buckley. Fairly well-to-do. A bit on the flamboyant side from what I'm told." He peered up at us. "There's a guy in town running this stuff down. He radioed it out to me just a short while ago. Anyway, his girlfriend said he was supposed to meet someone today—she doesn't know when or where. She says she thinks from the way he was acting that he was going to buy her a present for her birthday, which is the day after tomorrow."

"From the guy he was supposed to meet?" Martin asked.

"She doesn't know. It was just an impression she got."

Marie took a look around. "Doesn't look as though she's going to get her birthday present."

Pete shook his head. "Nope. Buckley weighed about one-eighty or so. Whatever got him was big enough to pick him up and shake him like a rag doll." He pointed at the blood in the trees, and in wide arcs in the bare sand. "That's where the beast was standing. It slung Buckley back and forth across this way, then tossed him into the grass over there."

Marie looked uneasy. "Any tracks?"

"The sand is dry and loose. It won't take a detailed impression. There are a few prints headed back towards the road, but about all they're good for is to judge the length of the stride."

"Should be an easy trail for dogs to follow," Marie noted.

"Tried that. Trail stops cold at the road."

Martin blinked. "Someone put this animal in their car and drove off with it?"

Pete nodded. "Looks like it. There are enough oddities that it occurred to me that it might be an alien. That's why I called you, since you guys are my resident experts on aliens."

Marie glanced around nervously. "Um, Pete, what if the critter didn't leave in a car? What if it's still around? Or maybe decides to come back to feed?"

"We thought of that. We've got a perimeter posted, just in case."

I left them talking and walked around, looking at the ground, the trees, the tall grass, the depressions in the sand left by feet. Then I followed the prints a short distance back towards the road, measuring the gait of the animal, and examining its mode of locomotion. Then I went back to where Pete, Martin, and Marie were standing, and announced, "We're looking for a quadruped, with heavy forequarters and tapered, much lighter hindquarters. There was a biped with it, probably a human, with roughly the same stride as Pete's."

Pete squinted at me. "How did you figure all that out?"

I unravelled a foot or so of tongue and indicated the killing site. "That's too torn up to tell much about the animal, but the trail is fairly clear for about twelve or fifteen feet. The front feet left deeper, more distinct depressions in the sand. There are three places where the rear feet stepped into the tracks left by the front feet. The rear feet left much smaller, less distinct prints—not nearly as deep. The rear tracks were also quite a bit closer together than the front ones. The biped walked on the animal's right side, about two feet away."

Pete snorted. "Norm!" he called out. "Redeem yourself. Check out what Victor's saying. Get pictures, plaster casts, and anything else you can think of."

I started stumping towards the body bag. "I want to see the body."

"Victor, it isn't pretty," Pete warned.

"Let's just say I've got a hunch," I answered.

Pete frowned. "A hunch? Want to clue me in?"

"It might not pan out," I allowed. "Let me save face, in case I'm wrong."

When they unzipped the body bag, I began to probe here and there with my tongue, since my arms aren't of much use. However, poking a corpse with one's tongue doesn't seem seemly to humans. Marie, even though she under-

stands, turned pale and found other things to look at. Martin and Pete watched, but certainly didn't look as though they were enjoying themselves.

"Victor, don't get your appetite whetted, I'm sure the family would like something left for the funeral," Pete said.

"Not ripe yet," I pointed out. I'm a scavenger. On the world I come from the climate is so hot and humid that anything that dies begins to decay almost immediately. My species prefers food that way. Adds flavor and seasoning to the meat, you see.

"Victor!" Martin protested. "Show some respect."

"The time to show Carl Buckley respect is past, unfortunately." Just then I found what I had been afraid I'd find. "Uh, oh."

Martin knelt beside me, peering at the area I was pointing at with my tongue. "What have you got?"

Pete squatted at my other side, and Marie quit looking up into the trees.

"See this tooth mark?"

"That's a tooth?" Pete asked. "It's just an 'X.'"

"Trust me. It's a tooth. We're talking off-world dentition, here."

"But—" Pete began.

"But me no buts," I told him. "I know this tooth print."

"Victor, I know you read a lot, but there's just the one mark. It could be a random cut," he protested.

"The creature that made this is the same species that killed Wanne's . . . mother, for want of a better term."

Martin stared at me. "Your girlfriend's mother?"

"Not girlfriend . . . para," I corrected.

"Wait a minute, Victor. That would mean—" Pete began.

"That someone, somewhere knows where my planet is, and has brought one of the most fearsome predators in the Universe to Earth."

Martin's face showed distaste. "Victor, isn't that a little overblown? I mean, even if you're right as to the identity of

this critter, calling it the most fearsome—"

I started to pronounce its name, but stopped. I speak with a tympanum, which allows me to form sounds that humans can't make. "Call it an athranx. Start with a six-hundred-pound bulldog, wide and powerfully built in front, narrow in back. Give its skin—no fur—a camouflage pattern somewhat like that of a jaguar. Endow it with the appetite of a shark, and about as much empathy. Then make it fast . . . very fast. When it wants to run, it puts its two rear legs together and uses them as one. If Buckley had run, you'd be seeing a three-legged print up until just before it pounced on him."

Pete shrugged. "That doesn't sound so bad. We've got lions and tigers and such. They're formidable, but manageable."

"But they aren't telepathic," I noted, delivering the coup de grace.

"What?"

"If you think you're going to jump behind a bush and hide, the athranx knows it before you finish the thought, and it's there waiting for you. If you're going to hit it high, it knows it and crouches. If you're going to hit it low, it leaps. In short, it knows what you intend to do before you do it."

Martin's eyebrows tried to rise all the way to his hairline. "That doesn't sound friendly."

"Oh, and by the way," I told Pete, "you'd better call in your perimeter. They're sitting ducks if it comes back."

"But they've got Gunther 10mm pistols. High velocity, copper-jacketed—"

"You can't hit what you can't see, Pete. An athranx has the ability to cloud your mind. They'd never see it coming. They'd think it was a shadow until it was too late."

He didn't stop to debate the point with me. He got on the radio.

The next step was to talk to Buckley's girlfriend. Yes, an officer had already

talked to her, but that was before we knew what we were looking for. We left Martin's car at the police station and the four of us went in Pete's police cruiser. Martin's mobile piece of rust just doesn't inspire the same respect.

I stood next to Pete in the front seat with the seat belt wrapped around my body several times for support. Sometimes I wonder what it would feel like to sit down, since humans seem to get such comfort from it. As it is, my body doesn't bend, so I stand on the seat. At least I can see where we're going.

Pete frowned as he pulled away from a stoplight and asked. "Victor, if an athranx is from another planet—presumably yours—then would it be able to live on Terrestrial foods? I mean, would Buckley be poisonous or something?"

"My body doesn't seem to mind eating Earth foods. It took me a while to learn what foods taste best, but they're nutritious."

"But it didn't eat him," Marie objected.

It would have been a good time to shrug, if I had shoulders. "Maybe the athranx didn't like the taste. Maybe the person controlling the athranx made it stop before it fed. I don't know."

Pete glanced over at me. "Victor, I'm having trouble seeing how this thing could pick up a hundred-eighty-pound man and sling him around like a puppet. I mean, six hundred pounds is a fair-sized hunk of muscle, but even something like a bear doesn't have a big enough mouth to wrap around a man's chest."

"An athranx can disjoint its jaw much the same way a snake can. It can't swallow something that big, so it picks it up and shakes it until parts rip loose. Then it swallows the parts and goes back to shake something else loose. I'm about the limit of what it can choke down whole."

Pete appraised my size before commenting, "Big throat."

"Big stomach, too. Fits into the front of the thorax, about where your lungs are. Shorter trip for food to travel. Less chance of choking, for that matter."

Pete puffed out his cheeks, exhaling noisily. "*Whew!* The more I hear, the less I like."

"Oh, and another thing. It plays with its victims the way a cat does. It will allow itself to be seen, then vanish, all to increase the fear its victims feel. Sometimes it will charge, then disappear, only to come at you from another angle entirely. The thought it detects most clearly is fear, so anything it can do to make you more afraid makes you easier to follow. It's cruel, but effective."

"But can't it see you?" Martin asked.

"An athranx doesn't have very good eyesight. It doesn't have to. Once they get within ten or fifteen feet of you, they can see fairly well, but beyond that, they work telepathically. That's good for about a quarter-mile or so."

Martin asked, "Do you think it actually tracked Buckley telepathically? Wouldn't humans think differently or something? An athranx might be able to read your mind, but not a human's."

I thought for a moment. "About two years ago, I ran across a paper by Grindstaff and Melton where they compared cognitive and emotional states between humans and five extraterrestrial species. They were not able to determine any difference, chemical or electrical, with currently available technology. They concluded that thought and feelings were governed by the same underlying rules, regardless of species. They drew an admittedly weak analogy of the difference between someone from Germany and someone from France. They may speak different languages, have different idioms, laugh at different jokes, but the underlying physiological processes are the same."

Martin said, "Rats. I was hoping I'd be safe because I'm human."

I turned around to look at him. "Nobody's safe from an athranx."

Carl Buckley's girlfriend was sufficiently well put together that Martin's IQ dropped precipitously when she answered the door. Marie bristled.

It goes without saying that Buckley's girlfriend had no effect on me, but I did find it interesting to observe Martin and Marie's reactions. There was a frozen moment while Marie glared at Martin staring at Buckley's girlfriend whose eyes were, in turn, locked onto Martin's. I broke the spell by kicking Martin's ankle. I then introduced myself without waiting to see whether Martin would snap out of it. "Good afternoon. I'm Victor. Are you Helen Hogan?"

She blinked and looked down at me. "Why . . . yes, I am. What can I do for you?"

"We'd like to ask you a few questions pertaining to Mr. Buckley."

"I already . . . there was a man—an officer—here a little while ago. He already asked me a bunch of things. I'm afraid I wasn't much help."

It was no surprise that she looked and sounded a bit rattled, considering what she'd been through. In spite of that, I thought I detected a faint flicker of interest in Martin. For better or worse, Martin has the same effect on women that they have on him. He's over six feet tall, with thick black hair and vivid green eyes—whatever he's got, women want it badly. If I didn't distract her quickly, she'd start casting Martin as her knight in shining armor. With Marie standing at Martin's side, attempting to shrivel him with the pure force of her will, I could see that it was going to be a tense interview.

To my relief, Pete took charge. "I'm Pete Sims, homicide division. May we come in?"

Helen broke from looking at Martin. "Yes, yes, of course. I'm just a little . . . well, you know, this has been such a shock. I . . . right this way, please."

She led the way into her living room. There was a picture on an end table of her with Buckley looking very much more alive than when we had seen him last.

Helen looked concerned. "Uh, Victor, won't you please sit down?"

"I'm unable to sit. My body doesn't bend that way. I'll be just fine standing, thank you."

"Clearly you're an extraterrestrial, but I don't think I recognize you. Where do you come from?" she asked.

"No one knows, I'm afraid. I was . . . kidnapped, for want of a better term, from my home world. Unfortunately, the man who took me died without telling anyone where he got me, so I don't know how to get home."

"Oh, how sad! Couldn't you at least narrow it down to a region in the sky or something?"

"My species never developed an interest in astronomy. We lived in a dense tropical forest. We knew the sky was up above the tree canopy, but it just never seemed very important."

"But aren't there any more like you? Couldn't you ask someone?"

"To the best of my knowledge, I am the only one of my species on Earth. However, you may be in a position to help unravel the mystery of where I came from." I proceeded to explain my theory that an athranx might have been involved in Buckley's death, and that, with luck, if we could trace the origin of the athranx, we might also discover the identity of my home world.

She was quiet for a minute after I'd finished. Then she asked, "Victor, you said this creature is . . . I think you said it was like a bulldog, right?"

"A bulldog writ large—and ugly, yes."

She frowned slightly, as though thinking. "Carl says . . . said that I needed a dog. For protection, you understand. He was very . . . jealous, I guess you could say. At first it was flattering. Then it became smothering. Still, there was some sense in what he said. About a year ago, I was getting crank calls for a while. It was kinda scary. Then there was a night in a parking lot where some guy was following me. I made it to my car and locked the door before he got there. Things like that . . . it made me feel sorta secure that Carl was so protective of me."

Maybe this athranx thing, maybe he was trying to get me a, you know, a guard dog. A really big, really fierce one."

Pete asked, "But something from off-world?"

Helen smiled softly. "I've always had a weakness for extraterrestrials. I think they're fascinating." She looked at me. "I think you're just adorable. I don't suppose you'd want to come stay with me?"

"Sorry, no, I live with Martin." As soon as I said it, I wished I hadn't, as I caught her giving Martin a speculative glance. Marie caught it, too.

Helen nodded. "Carl said there was a word for me. Xeno-something. Xenophile, I think it was."

"Someone who likes foreigners," I supplied.

She nodded again. "That's it. 'Phobes don't like whatever it is, and 'philes do like it. I'm a xenophile." She shrugged, palms up. "I'm sorry that I don't know more. If Carl really was trying to get me an athranx as a guard dog, I don't know where he'd get one."

We talked to her for a little while longer, but were unable to get any further. As we were leaving, I thought I heard Marie muttering under her breath about getting an athranx to protect Martin from predatory women.

Martin, for his part, seemed unconcerned about the danger.

It was nearly dark, but Pete said he wanted to drop by Buckley's apartment to see if anything had turned up. It wasn't a long drive.

There was only one officer there. He was wearing rubber gloves as he methodically searched every square inch of the apartment.

Pete hailed him as we came through the door. "What 'cha got, Mike?"

"Either too much or too little, depending on how you look at it," he said. "This guy kept all kinds of notes, but without him here to explain what he meant by 'Tue. 9:30 Ref.' we're going to have trouble unraveling what he's been

up to." He gestured towards a pile of small pieces of paper on a desk under a window overlooking the parking lot. "Be my guest. See what you can make of them. I'll keep poking around."

I turned in a circle, surveying the room. The furniture could easily have come from Martin's apartment. It was the same haphazard, unmatched bachelor furniture that I was accustomed to seeing in male human households everywhere I went. There was a bookcase near the door. I padded over to look at it.

"Mike," I asked, "have you been over this bookcase yet?"

He shook his head. "Not yet. I thought I'd be better off starting with the desk. It'll be a while before I get to that side of the room."

"Martin, pick me up," I said.

He was prodding at something on the kitchen counter, but came and did as I asked. "What's wrong, Victor? Too short to see the book titles?" he asked once we were on eye level.

"Short?" I protested. "Who's short?"

"You are, runt."

"It's not my fault that you've got enough growth hormones for Jack *and* the bean stalk. I'm three feet tall, and that's exactly as tall as I need to be."

"Hub! Well, if I'm the one who's the sideshow freak, then I'll just put you down and we'll see how well you do on your own." He made as though to put me back on my feet.

"Hey, someone's got to be the brains of this outfit, and since you're the brawn, that leaves the cognitive part to me. Up higher, you overgrown Neanderthal."

From my elevated position I could see there were a half-dozen more notes scattered along the edges of the shelves. "There," I said, pointing at a piece of paper with my tongue. "That one."

Martin shifted and read aloud, "Sat. 10:00 Barnwell Rd. Clark."

"Hey, Pete, what's the name of that little road we were on today?" I called.

He came over. "Barnwell Road, why?"

I passed him the note and reached for the one under it. "Hmmm, and now we have Clark's phone number," I added.

"I wonder whether Clark is his first name or last," Martin mused aloud.

"There's one way to find out," Pete said, moving towards the phone.

It would have been too much to hope that Clark would have been home just then. There was no answer, and no answering machine picked up. Pete called the station and had them backtrack the number. That gave us the address.

Mike, who was staying behind to complete his examination of Buckley's apartment, called to me as we were on our way out the door, "Victor, how did you know to look on the bookcase?"

I turned back to face him. "Human nature. Most people treat a desk like it's a big shelf. That left me wondering if Buckley treated the shelves like a little desk. They're near the door, so they'd be a convenient place to leave notes reminding himself what to do that day. Then he'd drop them on the desk once he'd attended to them. That's why all the notes you've found so far were old ones."

He shook his head. "You must be a mind reader."

"Just watch people. The trick is to look at things their way."

Pete winked at him as he reached to close the door behind me. "Leave it to an alien to tell us about ourselves."

Not only did we have our quarry's address, we had his full name: Clark Addison. Addison's place was out in the country and it was getting late, but with the possibility of a carnivorous alien running loose, Pete thought it was worth the effort to try to talk to Addison.

The Moon rose, fat and yellow, as we rode along back roads. Conversation ran in fits and starts. Marie asked if Addison had a police record. Pete called in on the radio and found that the answer was no. That was good for five minutes of

speculation, followed by silence. Martin wondered aloud how Addison had obtained the athranx. None of us had any way to know.

There were complex undertones in Martin's voice when he asked the question. He had inherited me when his uncle died. We had not gotten off to a good start. He didn't want a pet, which is how he viewed me at the time. I couldn't really blame him. His uncle had treated me as though I was no more than a football-shaped parrot—able to speak, but not really capable of intelligent thought. Understandably, Martin absorbed that attitude and regarded me as a burden. It was only after I had helped him solve a difficult case that he began to see me in a new light. The insults we traded became good-natured, and he and I became close friends. Now, knowing that there was a very real possibility that we might discover the identity of my home world, he was face to face with the possibility that I might wish to go home.

Nor was he the only one harboring such thoughts—I had unfinished business to attend to. Wanne, my para, was there. My life was incomplete without Wanne, and yet . . . my life would be incomplete without Martin, too. As frustrated as I get with Martin sometimes, I can't imagine life without him. So Martin was not the only one doing some soul-searching.

Marie asked if it was safe to go to Addison's house if the athranx was there. That occasioned discussion of strategies for dealing with athranxes. In the final analysis, I had to admit that there were none. I told her that I had a partial defense, but it was passive in nature, and would be of no use to them.

"How can you have a defense against something that knows what you're thinking?" she asked.

"By not thinking, of course," I responded.

"But—" she began.

"Marie, you're aware that, although I don't sleep, I have a trance state that I

sometimes use to solve problems, right?"

"Right."

"That trance state evolved to keep an athranx from tracking our thoughts."

"But you're thinking about the problem," Pete pointed out.

"Not exactly. It's more like putting your brain on standby for a while. If the athranx can't see you and can't sense your thoughts clearly, then it may go hunt something else."

"Sounds iffy," Pete said.

"It is," I admitted. "There's more than a little bit of luck involved."

"So how do we catch this thing?" he asked.

Much to my horror, my voice spoke before my brain engaged. "Use me for bait."

"What?" Martin squawked.

"It knows the . . . flavor of my thoughts. It'll come for me. I doubt that it's had anything familiar to eat since it's been on Earth."

"Victor!" Martin protested. "Listen, buddy, you've had some hare-brained ideas before, but this won't fly. The answer is no—not just no, but *hell* no! What if the athranx gets you? From what you're saying, it'd slurp you down before you could yell for help."

"I won't have to yell, Martin," I told him. "You'll be right beside me."

From the darkness of the back seat, I clearly heard him gulp.

That far out in the country the houses were a fair ways apart, with lots of land around them. We could see from a quarter mile away that every exterior light at Clark Addison's house was blazing. As we got closer, we could make out details. The front yard was wide and barren of anything but closely mown grass. The backyard, however, was a different story.

Cages, pens, and fences enclosed enough animals to start a respectable zoo. I could see two cages stacked, each with a panther. The pen next to them

held a danroff, something like a rooster with four legs. There was what appeared to be a baby elephant, an emu, and a juk, all side by side. And a man.

He was running frantically back and forth, a long stick in his hand, trying to herd a mottled brown blur back into a cage. If he ran left, the blur dodged right. If he swung the stick, it never made contact.

"Ladies and gentlemen," I intoned, "behold the athranx."

"Damn, that thing's fast," Pete breathed.

"It's fast," I agreed. "But the reason you can't focus on it is that it's clouding your mind."

He glanced sharply at me. "Then how's *he* seeing it?"

"He's not—at least not clearly. He hears it. An athranx isn't as good at obscuring sounds."

"Why doesn't it just kill him?" Marie asked.

"I don't know," I admitted. "Maybe it's just toying with him."

Even as the words left my mouth, the blur lunged, struck, and was gone, leaping the six-foot outer fence effortlessly. The man staggered backwards, his left hand clenching at the stump of his right arm, and fell to the dirt.

Without thinking, Pete slammed open the car door, running pell-mell towards Addison. Martin cursed under his breath, then ran after him. I stopped Marie in the act of reaching for her door handle, cautioning her to close the two open doors in case the athranx came for the car.

A sensation midway between heat and a tickle warmed the back of my mind. Soft, seductive, it began to spread . . . beckoning.

"Marie . . ." I started, then gasped as I felt the carnivorous intent within the velvet glove. "Marie, the athranx knows I'm here."

She leaned forward, placing her hand on my arm. "Victor, the car will protect you. You'll be fine."

"It'll break through the glass." I slithered out my tongue and began tugging at the turns of seat belt wrapped around my body. "I've got to get out of the car."

She slapped my tongue away. "No! Victor, don't give in, it's the athranx. Stay here."

"Marie, it's not the athranx, it's Martin and Pete. I've got to draw the athranx away from the car long enough for them to get Addison back here. He's going to need medical attention, fast."

"But, Victor . . ." she sighed. "All right. Here, let me help."

She unwound the seat belt, then leaned over the seat and me and opened the door. Before withdrawing to the back seat, she kissed me above my eye—where my forehead would be if I had such a thing. "Victor, you're the bravest little guy I know," she said softly. "Please . . . be careful. I really am fond of you."

Usually Martin lifts me out of the car, as six-inch legs aren't long enough to step out gracefully. I wasn't about to ask Marie to get out of the car, so I jumped—and fell flat on my face.

Before I could even roll over, Marie hopped out of the car. She set me on my feet. "Are you OK?"

"I'm a whole lot better than I'll feel if I get caught by that athranx. Get back in the car."

She closed my door, then slid into the back seat and pulled her door closed.

Running is not my forte, but I was determined to give it my best shot. The lives of three of my best friends depended on my ability to keep the athranx distracted long enough for them to get away.

I dashed—a decent walking speed for a human—for the other side of the road. The soles of my feet are soft and leathery, so I made almost no sound until I waded into the whispery tall grass. Not that the athranx needed to hear me; it could *feel* me. And I could feel it. Its mind was like a lighthouse beacon, sweeping the area, searching for me.

Its thoughts passed over me, returned, and locked on, becoming an almost unbearable itch under my scalp. I was terrified, but resisted the deeply ingrained impulse to drop into a trance state. Everything depended on my being able to lure the creature away from the car long enough for Pete and Martin to drag Addison back across the yard.

The athranx knew my intentions, of course. I was working on the assumption that it would regard me as a tasty enough morsel that it would ignore the larger, nearer target of two humans dragging a third in favor of a fresh meal from home.

Unfortunately, the telepathy only worked one way. I had no idea where the athranx was. Any inkling I got of its whereabouts would come from information it chose to give me, or through my own senses. Neither was of any use at the moment.

I sped into a stand of pines. There was nowhere to hide. The ground beneath the trees was carpeted with a soft layer of pine needles. Other than that, there were only the trees themselves. There was nothing to hide under, behind, or in. Climbing a tree was out of the question. My arms are far too weak to manage such a feat. I might be able to lasso a low limb with my tongue, but lacked the strength to pull myself up.

I kept running in a straight line away from the car until I heard a car door slam, then another. When Martin's voice called, I started straight towards his voice, realizing too late that I had turned the wrong way. The athranx had read my expectations and given me the illusion of Martin's voice, but off to my right instead of behind me where his voice should have originated.

I stopped, my feet skidding on the needles, just as the athranx pounced onto the spot where I would have been had I kept running full speed. It might be able to read my mind, but it wasn't able to change the laws of physics—it must have been in mid-air when I

stopped. I wouldn't be that lucky again.

I have few advantages over an athranx, but one of them is sharp vision. In particular, I'm able to see in the infrared when all is pitch black to others. I aimed for its eye, and shot out my tongue, stabbing it squarely. A tongue isn't much in the way of an offensive weapon, but eyes are sensitive. The athranx howled and leapt away from me. It would not give me much of a lead. The athranx didn't need its eyes to find me in the dark; it was only reacting to the pain.

Pounding back towards the car, I thought I heard feet. But these feet were in front of me. A bipedal gait.

Please, oh please be Martin . . .

Pete, back at the cruiser, switched on a powerful hand-held spotlight, revealing a towering silhouette who bent and gathered me into his arms.

"Victor! Are you all right?" Martin cried.

"Yes, but *run!*"

I didn't have to tell him twice. He covered the distance back to Pete's car in a third of the time it would have taken me. The ditch by the road was no problem for him—he leaped over it just as I heard the bone-chilling hunting call of the athranx behind us.

Marie had the car door open. Martin nearly threw me into the car. I skidded across Marie's lap and slammed into the door, head first. I forgave Martin even before the pain started.

"Step on it, Pete!" Martin yelled as he pulled the door closed behind him.

The car lurched forward. Pete had to turn in Clark's driveway, but as soon as we were turned around, he gunned the motor. A tremendous thud shook the car, which settled at the rear. Marie turned to look out the rear window and screamed. The athranx was trying to claw its way in through the glass as it hunched on the trunk.

Pete swung the steering wheel violently to the left, then right, slinging the monster off the side onto the asphalt. Without pausing to see if it lived, he

floored it, headed down the road towards the city.

Addison was huddled in the front seat, barely conscious. Blood loss was his worst problem, but his arm had been ripped off at the shoulder and there was not enough of a stump to tie a tourniquet to.

Marie gently righted me and made certain that Martin had his arm around me before leaning forward to try to tend to Addison as best she could. There was little she could do other than keep pressure on the wound.

She spoke to him quietly for a few moments, asking him what had happened. His reply was so weak that I could not hear it, but she spoke again, then listened again. He fell silent. She reached around and felt his throat for a pulse.

"He's in shock, Pete. Is there any way to get an ambulance to meet us half way?" she asked.

"Not in time, I'm afraid," he replied grimly. "The nearest paramedic station is a good twenty minutes away, even with them coming towards us."

She said, "He said that the athranx—he called it something else—was normally a decent enough animal to work with. But when he took it to Buckley, it had prowled around. That made Buckley nervous. Buckley tried to make it sit, as though it was a dog, then he hit it. As soon as he hit the athranx, it turned on him."

Pete nodded. "So Clark panicked and ran, taking the animal with him, hoping that no one would blame him for Buckley's death. Makes sense."

"But why did it attack Addison?" Martin asked.

Marie shrugged. "He said it had been impossible to control all afternoon. I guess once it killed Buckley, the blood lust started."

"Marie, did you ask him where he got the athranx?" I put in.

She shook her head. "No, sorry." She leaned over the seat to ask Addison. She

got no reply. She felt his neck again, then sat back heavily. "Addison's gone."

An ambulance did meet us to pick up Addison's body. Not far behind the ambulance were three police cruisers filled with men, and a K-9 team in a fourth car. Pete had called for reinforcements; we couldn't leave the athranx at large terrorizing innocent people.

The K-9 unit had been sent by some overzealous person back at cop-central who did not quite understand what an athranx was all about. They had had a vague plan to track the thing like a rabid dog, corner it, and dispatch it. Pete wasted the next ten minutes on the radio trying to argue them out of it. Then he pulled to the side of the road, showed them the crushed-in trunk lid, and the small sea of blood Addison had left on the passenger side of the front seat and floorboard. After that, discussion was less cocky and more productive.

Eventually things came back around to my plan, which was to set out bait, namely my tender self, and wait for the athranx to get hungry. There was one variable I had not counted on earlier. The athranx had fallen off the side of a police cruiser going over forty miles an hour and still accelerating. If the thing's neck was broken, our work was done for us. If it had merely bounced on its feet a few times, it was probably fighting mad, and up for some serious mayhem.

It was a good thing we hadn't been counting on finding the athranx dead in the road. We couldn't even determine exactly where it had fallen off the back of the car. After driving up and down the road three times, Pete sighed and pulled into Addison's driveway. Another car pulled up behind us, the others parked in the street.

Pete turned in his seat and looked back at me. "I was putting this part off, I guess. Victor, are you *sure* you don't want to wait for dawn? Hunting this thing in the dark scares me."

I summoned what courage I could and said, "We know roughly where it is now, or at least where it was as of an hour ago. If we wait too long, we're likely to spend the next few months chasing hit-and-run stories of babies stolen out of backyards, and dogs that quit barking in the middle of the night. This is not going to be an easy creature to find if we let it get away."

"But we need every advantage we can get," Martin protested. "Daylight will help us see it."

"Remember the blur in Addison's back yard?" I asked. "Daylight won't be as much help as you think."

Pete scowled in the wash of light from the floods that still shone from Addison's house. "Victor, tell you what—let's put you in a car instead of out in the open. Surely that will give you *some* protection."

I thought about it for a moment, then said, "OK, you've got a deal. But don't think for a moment that it will slow the athranx down for long. It's never seen glass, but that doesn't mean that it will take it long to figure out how easily it breaks. If nothing else, it'll pick the thought up from my mind."

Marie went back to the same point she had raised during the trip back to Addison's. "Victor, I still don't see why the athranx will fall for a trap, knowing that it's a trap."

"There's no guarantee that it will work," I admitted.

"But, Victor—" she began.

"I'm counting on the athranx being hungry. And I'm certain that it would prefer something that it knows from home, rather than something from here on Earth. We'll just pretend that I'm a takeout meal from a long, *long* ways away."

"So how are you going to call this thing?" Pete asked.

"I'll think tasty, succulent thoughts," I said.

Pete parked his car in the street,

about where it had been earlier in the evening. I didn't think that the spotlights from the patrol cars would deter the athranx, but I had them turn them off anyway. The microphone from the radio was in my hands; no stronger than I am, it took one hand to hold it and the other to key the transmit button. I was standing in the floor of the back seat, peering through the windows into the darkness of the woods.

Pete, Martin, and Marie had squeezed into other cars, so I was alone with my thoughts and Clark Addison's blood. Not a savory thought. Not to me, anyway. Perhaps the athranx would think otherwise, so I concentrated on the smell of the blood. I pictured the moment when the athranx had attacked Addison. Then I did my best to picture myself as alone and helpless . . . and edible.

Absolute terror was a good description of what I felt. Although I'd put up a brave front for Martin and the rest, there were numerous faults in my plan. I tried my best not to think of them so as not to give the athranx any ideas. Tough and persistent are good words to describe an athranx, but creative and intelligent are not. I was determined not to help it along.

Nearly thirty minutes passed before I felt the first twinge. I waited another few minutes until I was certain before calling softly over the radio, "It knows I'm here."

"Where is it?" came a voice over the radio, one I didn't recognize.

"I can't tell."

The tickle grew stronger very slowly, like watching the minute hand on a clock. *Come out to play . . . come out to play . . .* it seemed to be saying. What fun we could have. Hide and seek. Wordless images cascaded through my mind. Images of escape and pursuit. Exhaustion and capture. Pain and death. It was a one-sided game the athranx was proposing, but there was a seductive fascination about it.

Ancient fears bubbled through to the

surface of my mind. I needed to default, to go blank, to drop into a lifesaving trance state. Only then would I be safe from the athranx. It couldn't find me if it couldn't sense my thoughts. It took everything I could muster to force myself not to give in to thoughtless oblivion. I had to trust Pete, Martin, and the others to save me from this beast. In order for them to do their part, I had to do mine, no matter how frightened I was.

There was a sudden break in the athranx's thoughts. When the thoughts resumed, there was a distinct change. It wanted me to get out of the car. The car was a bad thing. The car had hurt it. *Get out of the car . . . get out of the car . . .*

I keyed the microphone. "Get ready. I think it's close enough to see the car. Either that, or it's picked it out of someone's mind. It wants me to get out."

Someone . . . Pete, snorted. "Well, hell, I reckon. I don't suppose it much cared for being bounced down the road like a basketball."

Get out . . . get out . . .

A sudden wave of claustrophobia hit me. Out! Out! I had to get out of the car!

I threw down the microphone and struggled with the door handle, tugging at it with my tongue. I forced the door open, ignoring the pleading voice from the radio. What did I care what Martin wanted? He wasn't the one who was trapped inside a tomb.

Miraculously, I didn't fall when I hopped to the ground. The roughness of the asphalt was the scratch to an itch I hadn't known I had. What a relief to be out of the car! I took a deep breath just as I heard a grunt ahead and slightly off to my right.

Something wrong, here.

Fear returned with almost sickening force. Humans speak of knees going weak. I had never thought it would happen to me, but I had been wrong. My legs were not obeying my command to run. Somewhere. Anywhere. Just get me out of here. Do it *now!*

Nothing happened.

"Lights!" I yelled as loud as I could.

One flashed on. Another. Then another. The cars were in a rough circle around me, boxing the compass. One in the road ahead, one behind, one in Addison's yard, and one pulled part way into the grass on the other side of the road. There was no light from that one, and that was the side I was on.

The grunt.

In hindsight, I could see the officer being hit from behind as the athranx came out of the woods. Now, I was standing in the darkness on the wrong side of the car for anyone to help.

Hot breath panted at me from somewhere close at hand. *There!* No. Nothing there. *There!* A flicker of movement, then it was gone.

My intestines were melting with fear. I was liquefying from the inside out.

The roof of the car dented in with a thunderous crash. I turned and looked up. There, backlit by the searchlights, stood the athranx, drool dripping past its teeth.

It leapt and a gun fired, half a second too late. I felt the weight of its body hit mine—a bone-jarring impact—and instinct took over. I blanked out.

Even in my trance state, I knew that it was too late. The athranx had already found me. There was no point in hiding now.

"Victor!"

Martin's voice cut through. I fought my way back to awareness just as the first flashlight came around the front of the car.

"Careful! Careful!" came Pete's voice. *"All right, everybody, just like Victor said, now . . . think!"*

The athranx stiffened, raising its head to glare balefully at the circle of flashlights. It shifted its weight as though to break for freedom, then growled deep in its throat. It gathered its rear paws, preparing to leap into the midst of the men behind the flashlights. Then it shuddered, faded from view, then flashed back into focus, more solid than

ever. It took a deep breath, and howled in defiance and hatred—a horrible, winding ululation that chilled me, even as I lay under its claws.

The guns barked and the creature collapsed on top of me. Six hundred pounds of very dead weight.

Late that afternoon, Pete, Martin, Marie, and I were back at Martin's apartment. There was also an uninvited guest—a fly that kept lighting on me, much to my annoyance.

I twitched my skin, sending it on a serpentine tour of the room, only to end up right where it started. I hummed a minor scale, full of foreboding and impending doom. The fly was unimpressed.

"I don't think the fly has seen enough horror movies, Victor," Marie offered.

Although my arms are weak, they're more than sufficient for swatting flies. What they aren't is fast enough. My attempt was evaded with contemptuous ease by the fly, who whizzed unconcernedly into the hallway, then back to light on me. *"Who will free me from this turbulent priest?"* I muttered.

"What?" Martin asked quizzically.

"Never mind," I growled. *"A quote. Something quite beyond your experience, I'm sure."*

He snorted. *"The only turbulent thing I see is your ruffled composure."*

"Easy for you to say, descendant-of-apes. I have more refined sensibilities. This uncouth insect is courting disaster," I told him.

I was in a foul mood. I hurt all over from being crushed under the athranx. And with Addison Clark's death, I had lost all hope of ever being reunited with Wanne. To top it all off, this insolent fly was tormenting me.

"Oh, yeah?" Martin taunted. *"And what are you going to do about it?"*

I brushed at the fly again, sending it off on another drunken orbit. *"Get the bug spray."*

Pete raised an eyebrow. *"Surely you're*

not going to spray yourself? You're the only place it seems to want to sit still long enough to get a good shot."

"The spray wouldn't be good for your skin," Marie added.

"I'll nail it with my tongue," I threatened.

"Says who?" Martin taunted. "It's faster than you are."

"We'll see about that," was my reply.

"So, Victor," Pete said, "explain to me why you wanted us to all think at the athranx."

"You couldn't see it clearly, right?" I asked.

"Right. It was blurred, like when we first drove up to Clark's place."

"Well, you could have shot at the blur, but then it would have known where you intended to shoot before you pulled the trigger. An athranx isn't faster than a bullet, but it is faster than your ability to take a bead on it. It would have jumped out of the way." I flicked my tongue at the fly where it sat on my chest area. It lifted off just ahead of my strike.

"OK, I can follow that. So what did thinking at it accomplish?"

"An athranx can fog more than one persons' perceptions at a time. Something like throwing out a mental smoke screen. But for it to read a specific person's intentions, it has to concentrate on that one person, or else it would be like trying to listen to five or six different conversations at a party at the same time." The fly returned to orbit my head once, looking for a suitable place to land. As fate would have it, the fly landed on the back of my head. I made an attempt, but without being able to see what I was doing, my tongue missed again.

"So by having us all think at the athranx at the same time—" Pete began.

"It was like having five or six people talk to you at once. You can't easily follow any one of them and you lose your concentration. Fortunately, the athranx lost enough mental focus that it couldn't even decide whether to run or attack,

much less more subtle things like cloud your minds. You shot, and it fell. On me, as it happens. Which is why I feel as though I've been through a rock crusher." I could see the fly coming from across the room, headed straight for me.

"Hmmm. Nice solution," Pete said, nodding. "Is that something they do back on your home world?"

The fly was getting closer. "No. There wouldn't be any point. We have no weapons. Since our arms are so weak, we couldn't even do any real harm by throwing stones. It's just something I came up with last night."

The fly feinted left, then dove right, but I was ready for it. I flicked my tongue—swish, and tagged the little beast in mid-air, curled the tip of my tongue around it, and slurped my tongue back into my mouth.

Martin's eyes bugged out. "Victor! You just ate a live fly! I thought you didn't like fresh food."

Marie's expression was about equal portions disgust and surprise. "Not only fresh, but *alive*. A live fly. *Yeech!*"

Now, mind you, I can talk around my tongue, since any sound I make is formed by a tympanum further down my throat. But the one thing I can't do is talk with my mouth closed. And if I opened my mouth, the fly would escape and all would be for naught.

Pete, for his part, looked like a well-starched English butler trying diligently to overlook the fact that the person he's talking to is a drunken, ragged bum three weeks overdue for a shower. "Victor, there's still one thing I don't understand. Wouldn't a telepathic predator tend to work against the evolution of intelligence? I mean, the smarter a species got, the more easily the predator could find them as prey, right?"

Martin guffawed. "*Hab!* I've been saying for years that Victor can't possibly be as smart as he thinks he is."

Didn't they realize that I couldn't answer?

So what does one do with a live fly in

one's mouth? I surely didn't intend to spit out my hard-won prize, in spite of the fact that it tickled insanely as it explored the inside of my mouth, looking for a way out. The best thing to do would be to let it go outside.

I was standing on the couch. Trying to communicate to Martin to lift me down would be an exercise in futility, not to mention taking longer than I could stand. The tickling was getting to be more than I could bear.

So I jumped.

Bad mistake.

I plowed into the rug face-first.

When humans are hurt, they habitually say something along the lines of "ouch." My response to pain is more of a buzzing sound.

Martin immediately jumped to his feet, picked me up and cradled me in his arms. "Victor, are you all right?"

I gulped and buzzed some more. "Nothing a chiropractor couldn't fix. What a day! I get clawed by an athranx, lose the only chance I'll ever get to figure out where I came from, get tormented by a fly—"

He shook his head. "The fly's gone, remember?"

Fly?

I started probing the inside of my mouth. No fly. Then I remembered swallowing. Yes, the fly was gone. I had eaten raw . . . not just raw, but live—

"What's wrong, little buddy?" Martin asked.

"The fly. I swallowed the fly."

"Well, sure. You decided to be a frog. Not my fault."

Pete chimed in. "Look, Victor, if you're going to take up a new line of work, I've got some really big cock-

roaches at my place. I'd love to have you drop by."

"Sorry, it's just that when I heard you buzzing like a fly, I thought—"

"You didn't think, you dumb oaf!" I blasted. "I didn't *mean* to swallow the fly. I was trying to get to the door to let it out."

"Well, why didn't you *say* so," Pete said. "I'd have gotten you off the couch."

I gave my best approximation of a sigh. "Because it's not polite to talk with your mouth full."

Marie helped me out by changing the subject. "What about Pete's question—wouldn't a telepathic predator work against the evolution of intelligent species?"

"In the sense that you mean it, yes. The predator itself would end up being the dominant species, as far as intelligence goes. But there's a loophole that we exploited. We learned to appear as dumb as other animals by dropping into a trance state. Mimicry does wonders for species here on Earth—it works just as well where I come from."

"I'll be damned. A mental chameleon," Pete breathed.

I grunted. "Yes, being able to slide my intelligence down to Martin's level has been invaluable on numerous occasions."

Martin's gasp was entirely satisfactory. While he spluttered and made sundry indignant noises, I gave Marie a solemn wink, trusting her to understand the difference between a blink and a wink from a one-eyed alien.

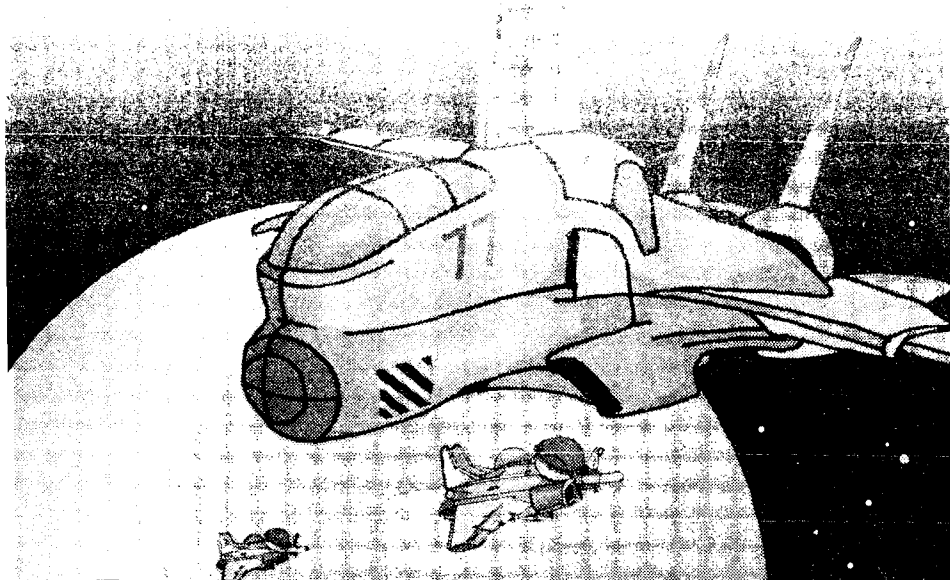
Pete arched one eyebrow. "I dunno about that, Victor. If it's true that you are what you eat, you just lowered yourself to the level of an insect."

Martin, the cretin, just smirked and said, "Now, that's food for thought." ■

(EDITOR'S NOTE: Earlier stories of Victor and Martin have included "To Victor Go the Spoils" [June 1990], "Victor Victorious" [December 1990], "The Victor" [January 1991], "Spoiled Rotten" [April 1993], "From the Jaws of Defeat" [July 1994], and "Garbage in, Garbage Out" [December 1995].)

Shane Tourtellotte

MESSENGERS



The starship dropped back into normal space ten thousand kilometers out from Epsilon Eridani's second planet. Lieutenant Avery Crumrie put them on an orbital insertion vector, while Ensign Drew Sorrell hailed New Plymouth's traffic control.

"Spaceship *Tau-74* requesting orbital approach. Carrying colony pod with four hundred settlers, foodstuffs, machine parts, recombinatory nanites. Full manifest available—"

"*Tau-74*, approach request granted." The silken voice was roughened with displeasure. "Acknowledging receipt of mail packet from Earth. Standard transfer procedures are in effect. Please remain aboard your ship."

Sorrell winced. That blasted automatic download was always the first thing a planet received from them. "Copy that,

Control. Could you open your video channel?"

"Negative, *Tau-74*."

"Sorrell," Crumrie said warningly.

Sorrell didn't heed. "Come on, Miekko. I know your voice. We've been in transit two weeks from Earth. Our passengers all keep to themselves. It would help to see a bea—friendly face when we arrive. Please?"

"*Tau-74*, maintain approach vector. We will send transfer schedules when you make orbit. New Plymouth out."

"No!" Sorrell pleaded for a while, but Miekko did not answer.

"Sorrell, you're making a fool of yourself."

"So what, Lieutenant? Not like New Plymouth'll notice. They want nothing to do with us. Just because—"

"You knew this would be the attitude

last year, when you signed up for FTL runs." He gave a fatherly smile. "It's nothing personal."

"Feels personal." Sorrell hunched forward. "I thought it was a stupid attitude, that it'd clear up, that I could change it, that..."

"There's nothing we can do about it. It's the price we pay."

Late in the twenty-first century, scientists discovered a fundamental relationship between information and energy. Creating information required entropy; scientists had known that for a long time. What they hadn't known before was that certain types of information had different effects on the energy needed to store and transfer them.

Experiments soon led to startling conclusions. Information, in the proper quantities and qualities, could drive energy to create tachyons. Within a few years, the first faster-than-light probes had returned from nearby systems. The route to the stars was open.

The colony pod descended into atmosphere, a swarm of cargo carriers following in its wake. "Robot ships," Sorrell grumbled. "You'd think they could automate *this*." He swept his hand across their compartment.

"If computers could handle ships this big, they would—and don't be so fast to put me out of work."

Sorrell pressed his hands to his hot cheeks. "There must be a better way. I mean, who says we can't carry old news? The early probe ships did."

"Because their destinations didn't have that information. Telling people what their historical records already contain doesn't move ships."

"Oh, how can the Universe know?"

"It knows." Didn't they teach trainees basic data drive theory anymore? Maybe they really were scraping the bottom of the barrel. FTL pilots got staggering pay, but most resigned within two years, and warned away new volunteers.

"But—" His console signaled. "Incoming transmission. Maybe it's Miekko. Maybe—"

It was New Plymouth's data-dump, giving them power for their trip home once the cargo drones returned.

Sorrell moaned softly. "Earth will hate us," he muttered. "Someday, it'll be as bad as here, or Dai Edo, or Saint Augustine Prime."

"Earth's a much bigger place," Crumrie said cautiously, hoping he didn't lose another partner. "Here, everyone has to absorb part of the data-dump, to close the causality loop. Back home, it spreads out much thinner."

"It'll still happen. Slower, but—" His head drooped. "There must be another way. Maybe, maybe we could direct our transmission into the ground, like the probes did."

Crumrie frowned. "How much energy did it cost to reorder the molecular structure of a stratum of granite with eight thousand years of the history of diseases? The probes had to do it that way, but it would bankrupt our company if we did it."

"Well then, cut the transmitter before it sends."

"And wind up disappearing from a causality disconnect? That's been tried, kid. The Universe doesn't cooperate. You gotta go by the rules."

"But it's not fair!"

Sorrell sunk into his chair, twitching with his frustration, muttering to himself. Crumrie shook his head glumly. Another washout.

The kid didn't understand that the Universe never gave something for nothing. Entropy always got its cut. You wanted to fly home FTL, you had to carry gigabytes of everything from murders and suicides to bad grades and broken dates, and suffer all the petty, irrational resentments that that evoked from people.

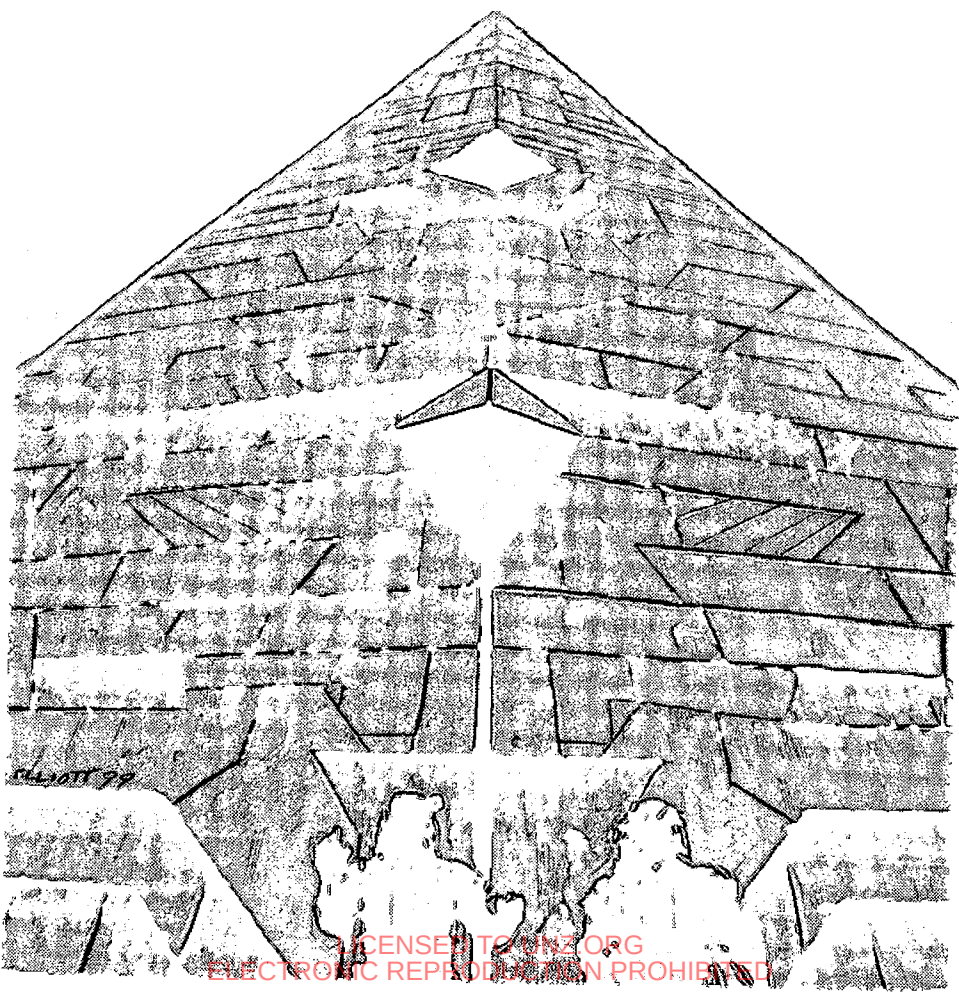
There wasn't another way. People had known how it was even before scientists proved it: nothing traveled faster than bad news. ■

F. Alexander Brejcha

TAKE A LOAD OFF

*Relocation to shed one burden
doesn't guarantee there'll be no new ones!*

Illustration by Davey Elliott



"Welcome to your new home, Miss Carstairs." Dave Mitchell from the Artemis Gamma Home Owners' Association stepped to the side gracefully and let me enter the condominium's main room.

Even though I knew it was thirteen by fifteen feet, the windowless room seemed smaller than I had expected from the sales brochure—until I saw the amazing four-by-five-foot display screen on the far wall. It was relaying a live picture from the lunar surface above us, and the sight of the full Earth hanging over the serenely pristine moonscape was breathtaking. The softly swirling lines of green, blue and white captured the eyes, and their beauty was enhanced by their contrast with the jagged lines of monochromatic light and shadow on the sterile, crater-pocked lunar surface—the barren surface above me! A line from an old movie popped into my mind: "We're not in Kansas anymore."

How true!

Not that I wasn't reminded by every step I took. It was nice to be under stable gravity again, but I still felt like I was floating as I walked into the room gingerly and finally tore my eyes away from the wall screen to examine my new home. I was used to my six-bedroom Bryn Mawr house on its grassy two-acre lot, and to my eyes this place seemed suffocatingly small, like all residences in Artemis-Gamma. But it was going to have to be my new home for the rest of my life. My prison! No more picnics and riding my horses in Valley Forge Park, no more Caribbean cruises, no more stretching out on a towel on the aromatic cedar planks of my deck to soak up the summer sun, and no more fresh air and fresh-smelling spring flowers in my garden. From now on, my life would be bounded by metal walls and shielding soil designed to keep me safe from a freezing vacuum and deadly bursts of solar radiation.

I took a deep breath and closed my

eyes for a moment, and then opened them again to try to view the condo in a different light. And after a moment I had to admit that as constrained as my future life would be, my new home looked surprisingly like a nice little apartment on Earth—other than the lack of real windows and the curved, eight-foot ceiling that supported the shielding moon dirt above. Pastel walls—a creamy eggshell color—and a short-napped brown shag carpet gave the place a friendly feel that was heightened by the rust-colored and plushly padded couch that waited invitingly along the near wall to face the Video Screen. The low faux-wood coffee table in front of it looked and smelled so much like real teak that I had to reach down to touch it to make sure it was actually reprocessed and scented lunar regolith combined with a polymer binder and coloring.

"The room terminal is in here," Mitchell pointed out, and then pressed what looked like a knot in the 'wood.' A two-square-foot section of the table flipped up like an old laptop to reveal a LCD screen and a touch pad. "Voice or pad, and you can use the small screen or switch the display to the wall panel if you want. You can also use it to select from the art-gallery files or the audio-visual library. We have about twenty thousand movies on file, digitized reproductions from over a dozen art museums, and all the music you could ever want."

He smiled. "And your home is sound-proof."

I shook my head. "I'll be dead before I can explore all that!"

"Ah, but you'll live so much longer up here," he pointed out. "After all, that's why you're here, isn't it?"

"Yes, but to work! I have to earn back the outrageous amount that I paid for this place!" Not entirely true, since my financial consulting agency was very successful, but I enjoyed the challenge of juggling money to maximize profits—for my clients and myself.

"Yes, but you know what they say,"

Mitchell tried again. "All work, and no play . . ."

"Well, I may watch a movie or two," I conceded. "Especially if you have any of the old musicals."

"Well, I suppose . . ." He seemed disappointed. "But we also have all the latest 3-D interactive—"

"I pass! But full Net access?" He looked vaguely offended that I should doubt it. "Good, then why don't you let me settle in and I'll call the Welcome Desk if I need any help." I had already spotted my bags piled up inside the doorway to the small bedroom.

"But I haven't shown you—"

"I think I can figure things out. I studied the brochures before I bought this unit, and I went through the obligatory safety orientation."

He looked vaguely wounded as I eased him out into the hall despite his continued protestations. But as I closed the door and spun the lock-wheel—each unit was air-tight in case of a breach—it proved that he had been right about one thing: the place was soundproof.

I leaned against the door with relief and ignored the slight twinge in my chest. The changes in gravity my body had been through the past few weeks were taking their toll, and my heart was letting me know how it felt about it. But I had been given a thorough check-up at the infirmary before following Mitchell down to my new home, and I knew I was fine. I had been warned to expect some mild discomfort until my body adjusted to steady gravity again, and I dropped onto the couch and closed my eyes for a moment before leaning forward to activate the terminal.

But before I could open it, the newsdaily that had been scrolling along at the bottom of the wall-screen caught my eye.

/// United Nations investigators will be arriving with the next shuttle to the Artemis Delta Observatory to follow up on the mysterious signals intercepted

by the leased SETI array . . . Keyword: U.N. Signals /// More UFO sightings reported from Farside . . . Keyword: sightings ///

Then the news summary went on with a slightly alarming solar flare activity report for the upcoming week followed by some "Community Calendar" updates. I shook my head as I thought about the UFO sightings. Even here, in the heartland of scientific observatories and laboratories, there was a touch of sensationalism. Which was actually rather reassuring, I decided as I opened the terminal cover.

"Audio library," I prompted.

"Selection?"

"Mozart, *Eine Kleine Nachtmusik*, original scoring and instrumentation."

"Random or Specific?"

"How many recordings do you have?"

I snapped, for some reason irritated.

"Seventy-four."

"Just put on the first recording made in this century!"

But as the ebullient opening obligingly bubbled out through hidden but wonderful speakers, I calmed down and leaned back to relax for the first time since I had started a long journey that had ended with wedging myself into the cramped Descent Module of the Lunar Transfer Vehicle after the flight from the space station to the moon.

This was home now—even if at times I knew it would feel as cramped as the LTV and the Descent Module. I wondered briefly if I should have spent the extra millions for a double unit at the end of a spoke. But it was too late for regrets now.

I looked around again. The nearly bare combination living and dining area was still bland and impersonal, waiting for my decorating touches, but I had several stitched-yarn wall hangings that would help take care of that. Working on them had been my sanity-saver for the past six months after my last heart attack. I had been a virtual prisoner in the hospital because of a nasty viral car-

diac myopathy, and I had been waiting for a compatible heart while hooked up to monitors and pacers and bent over my portable computer trying to keep in close touch with my clients and office. But I had finally told the doctors to screw themselves—an uncharacteristic expression for me that had prompted a few dropped jaws—and I had put in my bid for a unit in Artemis Gamma. The new moonbase community had only recently opened, and they were aggressively trying to sell out the last few vacant units. I had gotten a good deal that had made my overly-conservative accountant whimper for a week.

But I simply had not been able to take hospital life any longer. I was a very poor transplant risk to begin with, given my additional curse of an unpronounceable vascular disorder—so an artificial heart was totally out of the question—and I was also a very difficult tissue match, and the doctors had all hemmed and hawed every time I tried to pin them down on how long I would be waiting for a donor. The bottom line had been that on Earth I might have another ten years—if I got a new heart! But I had been told that under the one-sixth gravity on the moon, I could expect at least three times that, new heart or not.

Live to a decrepit late fifties—maybe—in a sterile, antiseptic-scented prison with no real privacy, or live for at least another thirty or more reasonably comfortable years in a small but attractive condominium on the moon? That was a “no-brainer,” and I had quickly decided that a three-second round-trip delay on my communications link was well worth it. Neither my clients nor my employees cared *where* I did my scheming.

Then a chime soured the quiet opening of Mozart’s second movement. I frowned and turned down the volume as I rose to answer the door. I hoped it wasn’t Mitchell coming to enlighten me about some “important feature” he had forgotten to tell me about.

But it wasn’t.

As I swung the carefully counter-weighted door open, I found myself facing a wild sight. My visitor was a slender and reasonably attractive, dark-haired man in his fifties with a spreading handlebar mustache that looked capable of supporting a small child on either end.

“Greetings, dear lady, and welcome to Gamma City!” he shot out as soon as I closed my mouth.

I took his offered hand hesitantly and wondered if I should call security or invite him in. He looked like a madman, with a shock of hair that was as wildly disarrayed as his mustache was impeccably groomed and waxed, and his black and silver tuxedo looked totally absurd when worn with the mandatory anti-static moon-slippers.

“Relax, Miss Carstairs. I’m harmless,” he whispered with a grin. Then he cocked his head. “Of course, maybe I do look a little odd to a newbie.” He straightened formally and in an accentless voice proclaimed:

“Heinrich Von Rheinstadt, at your service. Henry to my friends. I have come to invite you to a party. We follow GMT as a standard since we have residents from half a dozen different time zones, and accordingly, it is late afternoon. And if you are of a mind to join us, we have an informal welcoming dinner party starting in an hour. We have a diverse little community here, a bit different than the more scientifically staffed Artemis Alpha, Beta, and Delta. Among other interesting people, we have a movie mogul, a screen star, one of the world’s foremost best-selling authors, several corporate C.E.O.s, an heiress, and a huckster who made a fortune running pyramid schemes in the third world. We don’t all live here year-round, of course. For most of us, this is a retreat, but as it happens, over half our owners are in residence at the moment.”

“And if I’m not up to coming today?” I couldn’t resist.

He shrugged. “Why, then we’ll have a lovely party without you, and schedule

another one when it's more convenient for you. Maybe in three days when we're holding a UFO party anyway." He lowered his voice conspiratorially. "There have been some strange things happening lately." A strong flash of annoyance clouded his face briefly.

"I know. I just saw the news-daily," I added.

"Oh, that." He dismissed it. "Tabloid stuff." Then he gave me a boyish grin. "But whatever is *really* going on—it's a good excuse for a party, no?"

I had to laugh as he waited expectantly. "Fine, I'll be there . . . if you tell me where 'there' is. But," I looked at his attire dubiously, "if this is an informal party, what constitutes a 'formal' one?"

He dismissed it with a wave of his hand. "Informal here means 'wear whatever the hell you want,' and as for a formal party . . . well, if we ever have one, I'll let you know. We haven't been up here long enough to worry about it. And as for me, I just grab any excuse to wear this tux since I paid good money for it and only used it at my brother's wedding dirtside. But if you'll do me the honor of joining me, I'll return in an hour to pick you up."

I was a bit tired, but this was the perfect opportunity to find out about my new home, so I relented.

"Sure, I'll be happy to come. And call me Evelyn."

"Charmed. Then I shall return in an hour . . . or more?" He raised a questioning eyebrow.

"Ninety minutes please. I want to grab a shower first."

"I will be back." He bowed formally, and then spun to head back up the hall in the bounding, fluid steps of someone used to the low gravity.

"Fine. Bye, Henry . . ." But he was already gone, and I chuckled as I closed the door. A "Welcome to the moon party" . . . No, a gathering that would also be a welcome party. Still, it had been a long time since I had been to *any* party without the smell of antiseptics and the

sound of assorted monitors, and it might be just what I needed. Especially now that I realized who Henry was.

I even owned a good-sized chunk of stock in his company, Lunar Regolith Limited, of which he just happened to be the founder, chairman, president *and* CEO. Quite well off to begin with, he had taken LRL from a small venture capital startup operation to a successful corporation that had a virtual monopoly on lunar mining and ore processing. It had been a move that had led to him to be listed as one of the richest men in the United States. He had also made headlines around the world a few years earlier when his wife and four-year-old son had been killed in a botched kidnapping attempt. He had responded by posting a ten million dollar reward for information leading to the arrest and conviction of the kidnappers, and after the three men responsible had been arrested, he had used his influence to make certain an ironclad prosecution case landed all three men in prison for life with no possibility of parole. And he had then provided funds to build a new, escape-proof prison with an incorruptible guard system that made sure the killers would not have a comfortable sentence with access to the luxuries all too easy to obtain in most prisons.

A pretty determined man when he put his mind to it.

He was certainly entitled to a few eccentricities.

Wide awake now and feeling strangely excited, I headed to the small seven-by-eight-foot bedroom that took up half of the far end of the unit—the other half was the bedroom for the mirror-imaged next unit. The kitchen and bathroom were on the opposite wall, and utility lines and emergency supplies were tucked away on the other side of the living room wall, on the opposite side of the entrance. My unit was in one of eight underground radiating spokes that extended out from a large multilevel central hub that housed the control cen-

ter, the entertainment, community, and utility areas, and on the lowest levels the hydroponics farm. Each spoke was designed to house seven living units situated three on each side of a central corridor with a double-sized—and triple-priced—unit at the end of every spoke. All the units were designed to be self-sustaining for seventy-two hours in case of a major breach or other problems. And in the event of an emergency in the hub, each spoke was also equipped with an emergency exit to the surface at the far end. And the airlock at the surface was set up so that a rescue shuttle could dock with it to evacuate residents.

Gamma City, as the third Lunar habitat was more commonly called, was a nicely designed, if a bit compact, residential community with fifty-six small homes. I had not been able to bring a whole lot of belongings, given the weight penalty for luggage and the limited space available, but given the alternative, that was a sacrifice I had resigned myself to. But I *had* brought an assortment of clothes, and I went to my garment case and opened it—thankful for wrinkle-resistant fabrics—and sorted through its contents. Suddenly I had an intense desire to wear a dress. For weeks I had been in low- and variable-grav environments and I was sick of pant suits and jumpers.

At first I was torn between a nice casual burgundy and cream pants-suit, and a stylish one-piece gray-and-black Di-Sorento sheath dress I had bought and only worn once. But then I remembered Henry's comment and his tux, and I decided that "whatever the hell I wanted" meant just that, and I put away the casual outfit. Besides, if any pictures were taken and found their way Earthside, I wanted to look good. I knew any such pictures would be run by at least a few tabloids to show the escort of one of the most eligible bachelors around. And since they would have no problem finding out who I was, I would wind up with some free publicity for my agency.

Of course, an expensive dress meant some nice jewelry and a touch of make-up, and after a quick shower, I felt almost giddy as I dressed and rushed to put on the final touches and examine myself in the mirror.

I decided that I didn't look bad for an "old broad" who had refused to get any cosmetic surgery. No one would ever mistake me for a young woman, but neither did I look like I was in my late forties. The dress went very well with my newly styled and shorter red hair. But then I cringed as I put on the moon-slippers. Even if they were comfortable, they looked absolutely ridiculous with the dress! I was tempted to try to find Henry's number and cancel, but just then the doorbell rang and I looked at my watch in panic and saw that he was exactly on time.

Bracing myself, I went to the door and opened it, to see Henry's mouth drop.

"Miss Carstairs . . . Evelyn. I . . ." He straightened and gave a small bow before extending a crooked arm. "May I? I'll be the envy of everyone there."

Suddenly the slippers didn't seem so important.

Thirty minutes later I had forgotten all about my footwear as I tried to sort out a dizzying array of names and faces, not to mention wardrobes ranging from blue jeans and plaid shirts—but with designer labels—to business suits and pants suits, and even a few more tuxes and exclusive designer evening dresses—and all over the same ridiculous slippers! Apparently everyone did indeed wear just what they felt like, and to my relief, people were not segregating themselves by attire.

"Even if no one up here is hurting for money," Henry had admitted, "we all like to complain about it. And since clothes are the least space-consuming belongings to bring, wearing a range of attire and being individualistic is a big part of moon behavior."

But bouncing from conversational

group to conversational group and dodging the file-cabinet-sized roaming robot-waiters with their drink dispensers was getting tiring, and I was just about to call it quits when the attentive Henry grabbed my arm and pulled me away from a couple of married software engineers, Mr. and Mrs. Baumgartner—I had already forgotten their first names—and a movie star named Ralph Lanier who had bought a moon home to get away from the Hollywood hype with his latest wife, Sheryl—his fifth, from what I had heard.

"Enough is enough. Now take a break and sit down." Henry led me gallantly to a bench along a path and I breathed a sigh of relief. The two-hundred-foot diameter community hall in the three-story basement of Gamma City's hub was a delightful combination of lawn, sculpture garden and greenhouse that I really wished I could have had a chance to explore solo, but I had been quickly pulled into musical introductions. The only saving grace had been that other than a succession of genuinely friendly greetings, there had been little more than polite interest expressed, and I had not been forced to constantly repeat my life story to an endless succession of nosy strangers.

"We're a little overwhelming at first, I imagine." Henry sat down next to me. "But we'll be eating soon and that should help. I forgot how crazy it can be when one first arrives. Still, we're all basically harmless." But a brief frown and furtive glance across the central lawn made me wonder about that.

"What is it?"

"Ach, nozzing!" For a moment, a strong accent blurred his words until he straightened.

"I'm sorry, Evelyn." His boarding-school English was back. "Just a trace of paranoia."

"Paranoia about what?"

"Later. I promise," he added when I started to press him. "At dinner. I have a private table." His voice had dropped to

a mere whisper and he was leaning close, even as his eyes scanned the other Lunies and locked again on one particular figure.

The late-arriving Jack Mioshi was holding court in the sculpture garden now and monopolizing most of the others, which wasn't surprising as the Japanese filmmaker held a virtual monopoly on MegaVision Movies and was world famous. Lean and fit as an Olympic gymnast, he looked to be in his late twenties though I knew he was almost fifty. He had a compelling presence that one didn't need to be in earshot of to be affected by. People surrounded him the way Saturn's rings enhanced the planet; drawn and held by invisible forces, but kept at just the proper distance for maximum effect.

But appearances and intangible commodities were Mioshi's stock in trade. His company, Mioshi-Sun (a little triple pun I had always found irritating) Studios, had been the first to take a combination of Imax, 3-D, and Motor-Motion theater seats where no one else had dared: high-budget action adventure and science fiction movies. Given the scarcity of appropriate theaters, mass-market movies in this format had never been successfully marketed before. But he had moved to the United States and approached a variety of business consortiums with techniques ranging from slick-talking persuasion to virtual (and occasionally actual from what I had heard) blackmail, in order to put together a chain of the giant-screen theaters. Then he had filled them with a series of technically superb formula films that had drawn larger audiences than anyone had expected. He had correctly judged that American movie-goers were so jaded and sensation-seeking that the uniqueness of the format would bring them in in droves despite sky-high ticket prices. And after taking America by storm, he had extended his empire into Europe.

But Earth had not been enough.

Mioshi's latest project was a movie studio under construction on the moon, in Mare Crisium. And now that he was riding high on his success, he loved nothing better than attending parties where he could tell glowing stories of his own accomplishments and future plans. Fortunately he was an entertaining speaker, but I had heard his spiel when he had approached me for investors. It had been tempting, but after checking him out, I had advised my clients against investing in him because my informants had let me know that while his company seemed to be a good investment, Mioshi skimmed off too much of his profit. He was also under federal investigation for questionable business practices. That had been another reason for his move to the moon: he was out of U.S. jurisdiction there.

"Food!"

The anonymous and peremptory voice that cut through the constant cocktail-party chatter was welcome, and I grinned when I saw the studio head glare at the interruption and the immediate defection of his audience.

"Serves him right!" Henry whispered as he took my arm and we headed for the scattered dining tables in the restaurant-like dining hall that partially surrounded and looked in on the community area. The brightness of the light in the hall made me realize that dusk had fallen out in the greenhouse and that light had been provided only by discrete "street" lights scattered along the walkways and benches. The "evening" had come on so gradually that I had not noticed.

"We keep a twenty-four clock going here for the plants and the city," he explained as we sat down at a smaller table by the window looking out over the greenery. Then he spread his napkin in his lap and grinned. "Just wait till you taste your dinner, by the way. Tonight's fish night, and we grow twenty-pound trout up here. . . . You do like fish?" he asked anxiously and I nodded. "Excel-

lent, because the taste . . ." he kissed his fingers, "*c'est magnifique!*" He grinned and I had to laugh at his infectious good humor.

And dinner was everything he had promised as generous portions of baked fish and assorted steamed hydroponic vegetables were brought to our table. He also proved to be a charming and witty dinner companion, regaling me with stories about his hobbies of sailplane piloting and riding. That led to my wistful horse-reminiscing as I described the two Arabian stallions I boarded and bred, and the mare I kept in a stable near Valley Forge park for my riding pleasure—which led to the realization that we had a host of mutual acquaintances in the equestrian world.

But then as dinner ended and we started on a luscious peach sherbet dessert, he turned serious and pulled a small device out of a pocket and turned it on with a single switch. Two small lights on top of it, one green and one red, lit up briefly. Then the red one went out and Henry nodded and laid the sensor next to him where he could keep an eye on it. It wasn't hard to figure out why he had brought it, and between the steady green light and the empty tables that separated us from the bulk of the other diners, the privacy was comforting.

"We're secure." He straightened. "Now I'd like to ask for your help."

"For what?"

"You have a secure terminal, and I'd like to use it if I may. I checked you out and heard that you put in a coded data-link to dirtside."

"I had to! I can't have my clients' investment strategies broadcast out to anyone with a monitor . . . but don't you have one?"

"I suspect not." He shook his head. "I've been up here since my wife . . . since Gamma City was built, and by now I'm sure my equipment has been compromised." From the look on his face, I had the impression that he would

like to have been far away from the moon at the moment.

I laid a hand on his lightly, refraining from commenting on his slight slip since he obviously didn't want to pursue it at the moment. Instead, I kept my mind on his question and asked:

"'Compromised' by who? And why do you need a secure terminal?"

"To start some investigating . . ." He leaned forward to prop his chin on his free hand. "What do you know about Mioshi-Sun?"

"Enough." I told him what I knew, and he smiled.

"Oh, my dear. You don't know the half of it." He eyed the far end of the room where a self-satisfied Mioshi was holding court again between bites.

"Mioshi-Sun is expanding beyond movies, you see. Jack grew up a poor little boy without enough toys, and after admittedly making a success out of himself based on hard work, he's starting to get delusions of grandeur. He thinks he's a composite reincarnation of Walt Disney, Donald Trump, and Sirhan Kobak. Oh, he's building a studio, but it's going to be much more than that. He's putting up a studio-slash-theme-park with a hotel; complete with spaceplane service from dirtside to the station and travel via private LTV and landing module to his own field by the park. He's also going to have MoonBuses going from the park to Farside—he loved *2001: A Space Odyssey* and copied the MoonBus from the movie—and he's even going to offer—at a premium, of course—rides up into Lunar orbit whenever they are doing space-filming."

I shrugged. "So, what's the problem? Hell, I'll happily be one of his customers, even if I don't like him personally. It sounds like fun."

"The problem is that several of my geological survey-and-assay robots have disappeared, and always in the same area adjoining Mioshi-Sun property. Every time I ask Jack about it—to see if he's had any problems—I always get the

runaround about what a rough area it is, or he jokes about aliens grabbing them as toys. And he always tries to encourage me to survey in other directions." Henry frowned. "It's a gut feeling, but I just know he's up to something!"

"Have you checked the area out?"

"Well, Jack took me out in a MoonBus over the area to show me how rough it would be for mining, and even offered to buy the whole sector to expand his own park. He said he liked the rough look, and that I'd never get around to using it before my U.N. Land-Utilization Lease runs out, and that he would just file a claim when my lease runs out and get it for nothing. But he wasn't offering enough to make it worthwhile. I still have a year on the lease and there's plenty of time to start mining."

I glanced over at Jack, but he wasn't paying any attention to us so I turned back to Henry. "Think about what you just said. He took you out. But have *you* checked it out yourself? I wouldn't trust Jack any further than I could throw him—on Earth!"

Henry relaxed with a chuckle. "You *do* know him." Then he looked a bit embarrassed as he admitted: "Actually, I haven't gone out myself. I've been too damn busy. But you're right: I should." He scooped out the last of his sherbet thoughtfully and then cocked his head and studied me over his spoon.

"Wanna come? But you'll have to come on a sled. I don't bother with a fancy MoonBus like Jack, and it's a good trip. At least an hour in the open," he warned me, but there was also a note of challenge in his voice. "Each way!"

Suddenly I was scared. It seemed stupid to be nervous about going out on the surface of the moon; when I had already left the Earth on the spaceplane, transferred to the space station, gone on to the moon in the LTV, and finally been dropped down from the LTV to the moon in the tiny Descent Module. But Henry's offer *was* a little frightening for some reason.

Henry's hand suddenly embraced mine warmly as he made an acute guess. "Going out there in just a space suit strapped to a low-flying jalopy is a little different than the nice sheltered trip out here, huh?"

I nodded. "Uh-huh." He had put his finger right on it.

I had qualified in a suit, of course, since that was still required—I had even worn one in the LTV and the Descent Module as a safety precaution—but in each case, I had been inside a vehicle of some sort. Unlike the old descent stages where fully suited astronauts lay on their backs on an open rocket sled, even the trip from LTV to surface had been inside an enclosed—if very cramped—craft. And after we had landed, an access tube had linked us with Gamma City.

But then I thought about the parade of doctors, medical students and nurses who had hovered incessantly around me for the past six months, treating me like a condition instead of as a human being and forcing me to give up every ounce of freedom and pleasure because I might drop dead in their fancy state-of-the-art hospital and spoil some statistic or other.

"Oh, oh! I know that look!"

Startled, I looked up to see Henry grinning from ear to ear as he took another guess:

"That's the 'I don't give a damn what people think, I'm doing it!' look. Am I right?"

I sat up straight. "Yes!" And I explained why, overriding his concern when I described my medical condition: "I got the most thorough damn physicals you've ever seen—on Earth before I left, again on the space station, and *again* at the Infirmary when I got here. And the consensus here was that the low-gravity environment is already doing wonders for me." I patted his hand. "No, I *am* going. This is my home now, and I want to get a good look at it."

After a moment of concerned hesitation, Henry's smile returned. "Great. I'll

pick you up tomorrow around lunchtime. As for now, I'll walk you home. I saw your eyes droop a couple of times during dinner, and I apologize for keeping you up. I know you must be tired from your trip and all."

The next morning I awoke feeling incredibly refreshed after the best night's sleep I had ever had. Normally, I woke several times during the night with dizzy spells, chest tightness and headaches, but under the lower moon gravity, I was lying so lightly in bed that my body never had any of the usual little night-fits. It was still early, so after washing up and dressing, I parked myself at the computer to distract myself from any thoughts of my coming adventure.

Since it was still night in New York I started by leaving some instructions for my office staff, and then settled down to catch up on mail and to check out the European and Asian Markets. It was a relief to be working directly with a powerful mainframe again instead of a cellular-networked portable server. The time-lag between moon and Earth was a little unsettling at first, but after a while I got used to it, and the chime of the door surprised me as I realized Henry was here to pick me up.

After some fast-talking and pressure, I had cleared our outing with the reluctant medical officer—for insurance purposes—and as I opened the door, I felt a surge of excitement. This was something so totally alien to anything I had ever done that I couldn't wait.

Henry was dressed in a neat, blue-gray one-piece jumper this time and looked positively professional—except for the combination of wild hair and orderly mustache—and he nodded approvingly as he surveyed my own, similar, outfit.

"Excellent, Evelyn. I take it you're ready?"

I nodded, pushing aside a slight lingering nervousness as I closed the door firmly behind me with a twist of the

wheel and followed him up the hall to the hub.

Because of the planned duration of our outing, my space suit—and the expensive suit was paid for and *mine* because that was part of the Home Owner's Association requirements—was given an extra check-out after I put it on. But it passed with flying colors and I soon joined Henry in the airlock. His thickly gloved hand squeezed mine as the air was withdrawn, and as my suit began to distend I could see him smile behind his polarizing helmet.

"You'll do fine." His voice was a metallic crackle through our radio link, and I gave him a thumbs-up with my free hand as he reached for the door control when the air gauge showed that the airlock had been evacuated.

The wide lock door swung open to reveal the sterile lunar surface waiting for us. The covered parking lot was just a short walk away and I followed him gingerly. I didn't want to trip out here, and walking in the suit was harder than I had expected. The gravity was only a sixth of Earth's, but the suit was awkward and heavy, and inertia and the joint-bellows made it harder to begin a movement, and to stop it, than I had expected. But after a little while I got the hang of it, and I was able to enjoy looking around.

Gamma City was virtually invisible as I stopped to look back. Other than the sprawling solar cell farm that spread out in a glittering field on the other side of Gamma City, only the heavily shielded top two floors of the community were above ground. I looked down and wondered whose heads I was tromping on. Playfully I stamped my foot and heard Henry laugh as he seemed to read my mind.

"Wondering if Jack's unit is underneath?"

"Not really." I smiled. "He's too thick-headed to notice."

Henry chuckled again and pointed to an object parked under the carport-like

shelter next to several moon buggies with large tractorlike tires. "Well, we'll soon see what else he is. There's my sled."

The open contraption—vehicle seemed a kind word—that squatted roachlike on six spindly legs looked like a wheel-less metal erector-set concoction built by a manic-depressive five-year-old with access to a plumbing supply warehouse. It was basically a loose-ribbed metal framework surrounding a series of tanks and nozzles, on top of which were perched a pair of large chairs in front of an open cargo bed that looked like it had been pulled off an old pickup truck.

"She's a beauty, isn't she?" Henry said admiringly, oblivious to my disdain. "We're taking this instead of a buggy because we're going pretty far, and over some rough terrain." He patted its side. "She's never let me down yet."

I reserved comment as I climbed carefully up into the passenger seat and eyed the antenna array suspiciously. "We'll be in constant contact with Gamma Control?" The monitoring facility in the hub was set up to monitor all surface vehicles, as well as any LTVs and descent modules in transit.

"Yup. Latest beacon equipment around. Unless the signal is blocked by a high cliff or something, we'll always be online with Gamma Control via the Lunar Positioning and Relay satellites. We couldn't get lost even if we tried on Far-side." He settled down next to me. "That's why losing touch with my survey-and-assay robots is so puzzling."

He slid aside a metal shield on the sled's "dashboard" and tapped in a coded entry on the revealed touch pad. A succession of lights popped on and off, with some remaining lit.

"Let me just run my preflight, and then we'll be off," he muttered. He leaned forward to study the panel, his helmet reflecting a rainbow of blinking lights as his fingers danced over the touch pad. Remembering his earlier

mention of *2001: A Space Odyssey*, I had a vivid flashback to a similar scene in the movie, and I smiled. I was here!

I tightened my seatbelt and held on as I soon felt the sled start to quiver and stir up dust under us as the rocket nozzles activated to lift us silently off the ground. I was reminded of several science fiction movies I had seen, and I chuckled as we silently glided away from the parking area and Gamma City without the whooshing jetlike noises almost always used in the movies—even Mioshi-Sun features. There was just a faint vibration, and the silence was actually strangely reassuring in the way it lent an almost surrealistic feel to our “flight” at an altitude of about ten feet.

We were soon moving a lot faster than I had expected, and it wasn’t long before Gamma City was totally invisible. The stark landscape was awesome but uniform, and after a while the monotony of it set in, and it felt like any long turnpike car-trip. We were heading west, crossing over the top of a triangle of land that Henry had a mining lease on. To the south, I could see the results of his mining company at work, where huge gouges marked the ground as if a Bunyanesque cat had been scratching the surface. Tiny metal fleas were scurrying around the area, except that I knew that these fleas were metal ore carriers the size of a two-bedroom house. But other than that, there was little of interest to see.

“Gets old quick, doesn’t it?” Henry was reading my mind again and I nodded.

“I’d never have believed it, but it does.”

“Well, just wait till we get a little further,” he promised. “We’ll be hitting the Badlands soon, and it won’t be quite so tame. I would never have staked a claim there, but my geologist told me not to pass it up. My dirtside development team is building a replacement set of rough-terrain mining robots now and I

expect to have them up here in a few months—”

“A replacement set?”

“Yes! Some ecoterrorists blew up the original ones, and there was nothing but scrap metal left! They were screaming about my ‘ruining the natural environment of the moon with my mining.’ Can you believe that?” He snorted. “It’s not like there’s some damned spotted owl breeding out here.”

I shook my head. “I believe it. I saw their demonstration in New York last year when they were out to stop the ‘air-pollution’ on the moon.”

“Well, that’s actually more legit,” he admitted. “Leakage from the ore-processing plants and habitats are lowering the quality of the vacuum, and a couple of electronics companies had to move their operations.” He laughed. “Lunar air pollution. Sounds like an oxymoron!”

Then he leaned forward to point. “There.” I turned and saw the sudden change in the terrain. “The Badlands. We’re getting close to where my robots disappeared.” He leaned forward to call up a map in the dash display that showed a trio of glowing dots close to the moving rectangle that was our sled. “Five more minutes and we’ll be right over the area where we lost their signal.” There was an anticipatory edge to his voice all at once, and he was almost growling as he reached back to pull out a small video camera from the satchel he had brought.

“What do you think we’ll find?” I asked.

“I don’t know. One, or even two robots getting stuck or damaged in falls I can buy, but three of them have disappeared and there’s no way that’s accidental.” He grunted as he fumbled with a connector to strap his camera onto his helmet. “At least one should have survived long enough to send a status report.”

He had increased our altitude as we hit the Badlands, and now he slowed the sled as we crept close to the indi-

cated area on the map. Activating several sensors, he scanned the ground below us, but obviously he didn't find anything since his low muttering grew increasingly irritated. Finally he stabbed the off button on the sensor array.

"Nozzin! Not a *verdammtes Ding!*"

I smiled. "Let's get a closer look. There's a clear area down there. Next to that cave—"

"Cave?" He leaned forward. "There shouldn't be any caves here . . ." He manipulated the controls carefully and we slowly sank towards the ground until landing at a slight incline that was quickly leveled by the leg motors.

"That's no damn cave. That's a mine shaft! And on my land!" He was pissed off as he climbed down and made his way across the rough ground to stare into the pitch-black opening.

Now that we were on the ground, it was easy to see that he was right. An enormous amount of debris from the mineshaft was strewn out in a wide field, and I realized somebody had been digging for a long time to extract all this material. Henry was sweeping the area with his camera as he moved from place to place to check the ore with a small scanner while making indistinct, puzzled noises.

"What's wrong, Henry?" I climbed down and joined him, stepping carefully over the loose rocks.

He looked up. "There's prime ore here—all this stuff. My geologist was right." He indicated the whole field of rubble. "Someone's saved me weeks of work. All I have to do is come here and scoop it up and take it to the processing plants. It's as if all they were interested in was digging in."

He turned to the shaft opening and examined its sides carefully. "It looks like robot mining equipment's been digging here. Just like—"

"—like your 'destroyed' equipment has been at work?" I remembered his comment about the ecoterrorists and I

had a wild idea. "You said there was only scrap metal left—"

"—what if there was only scrap metal there to begin with because someone stole my equipment before bombing the factory?" Henry finished my thought perfectly. "The only problem with that is that it would cost a lot to get it up here to the moon, and it would be tough to conceal . . . *Scheiss!*"

I didn't need to know German to understand that, and I couldn't help smiling as he turned back to me.

"Mioshi! Hell, he could do it easily. He's got his own damn transportation network. No wonder he wanted to keep me away from here." He stopped and looked into the tunnel again for a moment before heading back to the sled to grab a lantern from a storage locker.

"I'm going to check it out—"

"And leave me here?" I grabbed the other lantern in the locker. I wasn't about to be left behind, and I think he knew it because he started to protest, and then sighed.

"All right. But at the first sign of any—"

"Any trouble, we leave," I finished. "But first I want to call Gamma Control with our coordinates and let them know—"

"No! It's an open frequency and Jack may be monitoring. Fortunately our helmet signals could never get out of this valley or whoever did this might already know we found the tunnel, but I am not going to broadcast this on a satellite channel!"

I eyed the enticing opening, dying to explore it, but I didn't quite trust it. Then I had an idea.

"Can you set up a time—"

"A time-delayed transmission!" He chuckled and headed back to the sled. "Great idea." Opening up the dash, he keyed in a sequence and then made a brief recording that detailed our plans and location.

"There." He turned back to me. "If we don't manually cancel it in an hour, the sled computer will send out a detailed

distress call. Now come here." I joined him as he topped off our oxygen tanks from the sled's auxiliary tank. "Just in case," he conceded, and then took my arm to re-enter the tunnel mouth.

"The mining robots are equipped with sensors so they can follow a vein of richer ore if they find one," Henry continued as we entered the tunnel and followed it into the hillside. "And the Robo-Miners control miniature ore carriers that remove the mined ore and deposit it outside for pickup—except no one ever picked any of it up. And it's rich ore." He sounded puzzled as he played the beam of his lantern across the level tunnel floor up ahead and back behind us.

"And from the looks of this," he went on, "and the amount of ore piled up outside, this digging operation has been going on for weeks! And the tunnel is heading straight for Jack's land. It begins just over this hill, about a half-mile west."

"If he's doing this, then he must have spotted your survey robots and destroyed them before they could send back a report of this dig. But why weren't we spotted?" I wondered.

"There would have had to be human supervisors on site during the initial entry," Henry explained. "They would have to program the Robo-Miners and test the integrity of the shaft and area until they could be sure it was secure—"

"But now it's all automatic."

"Exactly." He stopped and bent to examine the ground. "Except someone's been here recently."

I aimed my lantern down and squatted as much as possible in the suit to see skinny tire tracks in a patch of powdery debris.

"From the ore carriers?"

"Uh-uh. These tracks cross over the ore carrier tracks—those have a different tread pattern . . . like that." He pointed to the other, much fatter, set of tire tracks on the ground. "That would explain the last surveyor that turned up

missing. By then, this would have all been on automatic, but if someone is bringing stuff out of this tunnel, then they might have spotted and destroyed it."

"But what would they be bringing out if they're not interested in the ore?"

"Good question." He glanced at a wrist monitor, and then shone his light down the tunnel and stopped. We had come well over a quarter mile already and there was no end in sight. Straight as an arrow, the rough and curved sides of the tunnel thrust out ahead of us mysteriously, a constant seven feet wide and six high.

"This thing seems to go on for miles," Henry groaned. "We're going to have to go back to Gamma and get a small buggy. I don't feel like a multimile trek, and we might not have enough air."

"A buggy?"

"Sure. We can strap a small one right on the back of the sled. . . ."

He stopped and turned and I realized why. It was suddenly a lot brighter in the tunnel as a moon buggy approached from the surface, its bright headlights casting their harsh glare across us. A shadowy figure climbed off and slowly approached us.

"Hi there, Henry," a familiar voice greeted us. "I should have known you couldn't leave well alone." It was Jack Mioshi. "And who is that with you?"

He stepped closer, directed a lantern at my helmet, and peered through the face plate. "Miss Carstairs? Don't tell me he dragged you out here?"

Squinting, I pushed his lamp aside. "I wasn't exactly 'dragged' out here. It was actually my idea to come."

"What a shame."

"What are you up to, Jack?" Henry moved in between us protectively.

Jack laughed. "Well, it's nice to see that chivalry isn't dead. Though I think you're out of your element here. There are no S.E.C. or Justice Department accountants here to protect you. This is real life, and I have a number of well-

armed employees with minimal morals who will make sure that the considerable millions of dollars I have at risk are protected." He waved. "Meet Mr. Matheson, one of gentlemen I refer to."

A looming figure climbed out of the buggy and stooped to move wordlessly closer, briefly brandishing a strangely shaped weapon I recognized as a vacuum-modified rifle.

"But what the hell are you up to?" Henry repeated angrily. "And what are you bringing out of here?"

Jack laughed again. "Wrong question. I can honestly say we're not taking out a thing. But I suppose we can enlighten you a bit more. If you'll please?" He indicated the buggy. "We'll give you that buggy ride you were planning."

"I don't suppose we can pass on it?" I tried to ignore my suddenly racing heart. I couldn't believe what was happening.

"I'm afraid not." Jack actually sounded regretful as he pushed Henry towards the buggy and grabbed my arm. Henry stiffened but I stopped him.

"Don't, Henry!" I climbed into the back seat of the buggy.

"Listen to her," Jack warned in a strangely intense voice that scared me. "I really do wish that you would have left this alone, because now I have no choice."

As Henry joined me, I didn't want to press Jack to explain since I had a pretty good idea what he meant, even if it seemed too wild to be possible. I just rode silently while Matheson, whose face was invisible behind his visor, followed behind us at a rapid clip with his head bowed and his rifle held ready.

"By the way, Henry," Jack remarked. "My compliments to your design team. Your mining robots are superb, and they saved me millions, even if I did have to pay to bring them up here disguised as construction equipment. We couldn't wait for you to bring them up, and besides, trying the 'ecoterrorist assault' up here would have been too far-fetched. No one would have believed it."

I could tell Henry was dying to ask what Jack was doing with his Robo-Miners, but he bit his tongue and I followed suit. Mioshi obviously had his own ideas about how to tell us.

We rode in silence for another half mile or so, and then I saw a bright light ahead of us.

"We're now on my property, by the way," Jack declared needlessly. Henry had already pointed out that the tunnel was heading straight for Mioshi's territory. "And here we are!" he exclaimed as we rolled into a small artificial cave dominated by an eerie pyramid about twenty feet tall at the apex. Large unfiltered studio lights filled the room with a harsh glare, but the pyramid seemed to absorb the light hungrily as if it was a hole in space instead of a physical object.

For a moment, I stared at it in awe, and then the truth hit me just as Henry muttered:

"Somebody cue *Also Sprach Zarathustra*." He turned to me. "A different shape, but I told you he liked *2001*." He laughed. "No wonder he had to dig laterally over from my property to get onto his own land." He turned back to Jack. "But I don't believe you went to all this trouble so you could plant this thing here, and then publicly dig it up on your land. It's impressive, but you can't seriously expect to pass this off as an alien artifact! It won't take an hour before it's discovered to be fake."

"You underestimate me, Henry." Jack sounded annoyed. "You're not the only one with a good design team on tap, and this cost more than both sets of your mining robots combined. But it'll be worth it. I've already convinced millions that there are spacemen flitting around the system, and this will be the clincher. It's all in the presentation, you see. If there's anything I've learned as a moviemaker, it's that if you give the suckers what they want, they'll eat it up. And the more mysterious, the better. So, much as it will pain me, no one will get the chance to debunk this." He climbed

out of the buggy and went over to stroke the strangely surreal surface of the pyramid. "Special effects, my boy. Special effects!"

He turned to us without explaining further. "We're almost done here. All I have to do is to reprogram the miner, and arm the fuses, and then get clear." He sighed. "But you two, I'm afraid, will become casualties of war. Commercial war, that is."

"How much?" Henry asked abruptly.

Jack's expression was unreadable beyond his visor but his body stiffened attentively. "For what?"

"Our lives. Frankly, I don't give a damn what a bunch of gullible rat-racers think. Let them think that aliens are coming to bail them out of boredom and AIDS infection-paranoia. Hell, it might even make people relax a little. I doubt anyone still seriously thinks we're going to get invaded. Aliens have been elevated to just a bit below Godhood. As for Evelyn, all she wants is to live a longer life than she would have had dirtside."

"It's tempting," Jack responded after a moment. "But I'm sorry, I can't take that chance. Besides, Evelyn there caused me some major problems when she turned off a lot of potential investors a couple of years ago. She cost me a *lot* of money!"

"You mean you had to stop embezzling for a while to increase your profit ratio," I cut him off, trying anything to break the grip of the numbing disbelief that was overwhelming me.

He was going to kill me!

I couldn't believe it. For years I had known exactly how I was going to die, if not exactly when. It was to have been dramatically and rapidly, with perhaps a moment of numbing pain as my faulty heart gave up pumping, or one of my major arteries ruptured, bottoming out my blood pressure to black me out. Either way, I would die either in an ambulance, or in an emergency room or hospital bed with dozens of scurrying doctors and nurses desperately trying to keep me alive.

But this? Just when I had finally started to believe that I might just have a more normal lifetime to look forward to—even if a slightly restricted one? It wasn't . . . fair!

Henry moved closer and took my arm. "I'm sorry, Evelyn. All I wanted was to have some pleasant company, and to give you a taste of the environment. I never—"

"It's not your fault," I snapped, angry at myself for the way I sounded. I turned on Jack. "So what are you going to do? Shoot us?"

"No, that could be awkward," he answered matter-of-factly. "If you're ever found, it will look like a tragic accident, but basically, you're just going to disappear. Another mystery of the moon. Which will fit in quite well actually."

"With what?" Henry muttered.

"With the sightings."

"They're your doing?" I guessed.

"That's right," Jack admitted smugly. "Given the talents of my special effects crew, it was quite a simple job. The hardest thing was to limit the number of people in on it. I don't want anyone to give—"

"What do you do?" Henry broke in. "Kill them when they're done?"

"Don't be silly. I have a very motivated inner circle. They all have certain . . . aah . . . employment and social handicaps—"

"Convicted criminals," I ventured.

"Exactly. It's amazing the loyalty a good paycheck generates from people who have had a difficult time getting work."

"And I'm sure there's a stick in there also to make sure they stay loyal?" I felt ill as the air seemed to get stuffy and the suit pressed claustrophobically in on me.

Jack nodded. "Plenty of them. It's just good business."

"So now what?" Henry pressed.

"Well, we're going to leave the two of you here in the tunnel—just a lot closer to the entrance—and then collapse it with a few wired remote-controlled

charges. Your radio signal can't penetrate all this ore, and if they ever find you, the conclusion will be obvious: You had started some new exploratory mining, and being anxious to show off, you made the mistake of taking Miss Carstairs into an unstable tunnel. A tragic accident."

He sighed. "But while we're burying you, the miners will pack in ore around the pyramid and then backtrack a little before blowing up their end of the tunnel. I want them out of the way just in case there is any future digging around where the pyramid will be found."

"Found how?" I asked, stalling for time to think.

"Let me guess," Henry cut in. "A magnetic anomaly will be detected as you continue to survey prior to ground-breaking for another 'attraction.' And naturally, you'll just happen to have your best camera equipment on hand as you dramatically dig down to uncover this amazing artifact—and you'll probably manage to have top reporters on hand, too."

"Ah . . . yes. The publicity." Jack was positively gloating.

"You're so predictable!"

"In that case, what next?" Jack shot back in an irritated tone.

I remembered what he had said earlier. "It's going to self-destruct."

Jack spun stiffly. "That's right. And that's the best part. It will start by sending out a wide-spectrum signal that will bust the eardrums of every radio listener for billions of miles, as a warning, and then I am going to have my own little meltdown!"

Henry and I both gasped, and Jack sighed.

"That was the expensive part. Inside this little package," he indicated the pyramid, "is an extremely sophisticated miniature reactor that will activate on my signal to power the radio transmission, and then it will go critical and melt down—literally—the pyramid and the immediate area. That wasn't so hard. A reactor this small is inherently unstable

anyway. But it means that this whole section of Mioshi-Land will be lethally radioactive for thousands of years. Fortunately it just happens to be far enough from my hotel so that my many, many guests will be safe, and shielding the tour buses will be simple. Strangely enough, they are already very well shielded." He chuckled. "You know how paranoid designers can be when worried about safety regulations and insurance."

He was back to his usual loquacious self as he happily finished detailing his admittedly brilliant scam. "Of course, I'm afraid that I'll have to raise all my prices when the alien beacon is discovered. The laws of supply and demand, and all that. After all," he sighed dramatically, "I only have so many hotel rooms. Until I build more."

"Very nice of you to lay everything out so clearly," a brisk female voice interrupted as three armed figures strode out of the tunnel into the lighted cave. I could just make out the faces of two men and a woman behind visors partly obscured by the reflected glare of the lights.

"Drop your gun, Matheson," a guttural male voice with a heavy Russian accent ordered as the tallest of the men stepped forward menacingly and raised his rifle.

Jack's companion spun, but quickly complied as he saw three weapons leveled at him. The Russian claimed the rifle and then stepped back to cover Jack and Matheson as we moved away from them with relief.

"Who . . ." I started, and the woman stepped forward.

"Lieutenant Ursula Brenner, U.N. Security Forces, Sergeant Ivan Popov, and Corporal Michel Bouchard." The Russian and the silent second man bowed lightly. "We've been after Mr. Mioshi for some time."

"On what grounds?" Jack challenged.

"Hiring and transporting fugitive felons on U.N. protectorate lands. But

now we can add illegal use of leased property, illegal use of nuclear materials on U.N. protectorate lands, kidnapping and attempted murder—”

“The latter are out of your jurisdiction,” Jack cut her off.

“Out of mine, perhaps, but Sergeant Popov is not U.N.. He’s Gamma City Constabulary,” Brenner pointed out gleefully. “And this most definitely *is* under his jurisdiction.”

Behind Popov’s visor, a heavily bearded face split in a wide grin as he began reciting the Revised Miranda to Jack and Matheson, while Michel placed restraints on them.

Henry turned to Brenner. “How did you find us . . .” He hit his helmet with a hand and chuckled. “The signal!”

I had also forgotten about it, and I grinned. “Aren’t you glad I insisted?”

“Definitely!”

“Actually,” Brenner corrected apologetically, “Mioshi disabled that, but we’ve had a tail on him for several days. We’re cooperating with the U.S. Justice Department since there are fugitive warrants on several of his employees, and the moon is out of their jurisdiction.”

She turned to Jack. “When you came out here, we didn’t know just what you were up to, so we set up surveillance outside. We were a little confused when we saw you bringing material *into* the tunnel, and we were planning on contacting Mr. Rheinstadt for permission to enter. Until we saw him arrive with Miss Carstairs, just before you returned.”

“And then you thought I was helping him!” Henry burst out with a laugh. “Fat chance!”

“Well, we couldn’t know that,” Popov pointed out as he led the prisoners over to the buggy Mioshi had fetched from the tunnel. “Despite what we heard you tell Miss Carstairs. You could have been lying to her.”

“But then,” Brenner added, “we heard him take you prisoner and that gave us probable cause to enter.”

“And you followed us down the tun-

nel, listening in on our radios.” I got angry as I wondered how long they had been lurking in the darkness, waiting to make their move while we thought we were about to be killed.

Brenner sounded sorry as she added: “We didn’t like to leave you hanging, but once we realized you were in no immediate danger, I thought it best to get as much information as possible. And that’s fortunate, or we would not have known about the plan to trigger a nuclear melt-down.” She held out a hand and I saw a tentative smile behind her visor. “Forgiven?”

My initial resentment evaporated as I saw that she was right. I took her hand to shake it clumsily through the gloves.

“Forgiven. But do me a favor and don’t tell Gamma City Medical about this. I think they would have a collective heart attack for me if they knew.”

“Done!” She grinned. “In the meantime, I don’t think Mr. Mioshi will mind if we appropriate his buggy to get you back out to the sled. Then we’ll meet at Gamma City Control to take your formal statements.”

My legs were weak from relief as Henry took my arm and led me over to the buggy, leaning his helmet against mine to speak strictly through conduction.

“Can I take a lady out for an exciting date, or what?”

“Yes, you can!” I tried not to laugh. “But next time, let’s just try the dining hall, or a picnic in the park, okay?”

“Does that mean that there will be a next time?” He cocked an eyebrow hopefully as we climbed into the buggy and settled into our seats.

I didn’t have to think about it and I smiled as I leaned over to touch helmets again. “Why not? We have a bond now, and it would be a shame not to explore it.”

“Great! It’s been a long time since . . .”

He fell silent and his hand tightened on mine and he blew me a kiss as the buggy turned and headed back out the tunnel to the surface. ■

THE REFERENCE LIBRARY Tom Easton

Souls in the Great Machine, Sean McMullen, TOR, \$27.95, 448 pp. (ISBN: 0-312-87055-8).

Gravity Dreams, L. E. Modesitt, Jr., TOR, \$24.95, 399 pp. (ISBN: 0-312-86826-X).

The Cassini Division, Ken MacLeod, TOR, \$22.95, 240 pp. (ISBN: 0-312-87044-2).

Starfish, Peter Watts, TOR, \$23.95, 317 pp. (ISBN: 0-312-86855-3).

Teranesia, Greg Egan, Harper, (ISBN: 0-061-05092-X).

Saucer Wisdom, Rudy Rucker, TOR, \$23.95, 277 pp. (ISBN: 0-312-86884-7).

Dark Life: Martian Nanobacteria, Rock-Eating Cave Bugs, and Other Extreme Organisms of Inner Earth and Outer Space, Michael Ray Taylor, Scribner, \$23, 287 pp. (ISBN: 0-684-84191-6).

Chemistry and Science Fiction, Jack H. Stocker, ed., American Chemical Society, 292 + xxii pp. (ISBN: 0-8412-3248-2).

The Science of Star Wars, Jeanne Cavelos, St. Martin's, \$22.95, 245 pp. (ISBN: 0-312-20958-4).

One of the solutions proposed for global warming has been a sunshade. Imagine it! A gigantic parasol orbiting the planet to deflect a portion of the sun's heat! It's beyond current technology, but perhaps nanotechnology could do the job, using self-reproducing von Neumann machines and lunar resources.

Of course, Murphy rules the universe. Let's have a war here at home, with orbiting battle stations responding to every sign of electrical activity with circuit-frying electromagnetic pulses. That takes care of computers, power stations, automobiles, airplanes, and civilization itself. It also cuts short the release of greenhouse gases from fossil fuel combustion.

That is, no more global warming. But the sunshade is still up there, turning down the heat. Add a spot of nuclear winter. Now we have an ice age, known

to the scattered survivors of humanity as the Greatwinter. Once Greatwinter wanes, however, humanity finds that those orbiting battle stations are still up there and still zapping any sign of electrical activity. If there's any hope of rebuilding technological civilization, it can't be by the path we followed. No dynamos, no radios, no computers.

Yet Sean McMullen reminds us in **Souls in the Great Machine** that there is more than one way to skin a cat. His setting is Australia some 1,700 years after Greatwinter's Waning. Travel is by rail, with trains powered by wind (vertical, revolving sails) and pedal (passengers who work hard enough get paid for making the trip). Communication is by "beamflash" network, towers that use mirrors by day and flares by night to send messages.

Computers? Meet Zarvora Cybeline, Highliber of Libris, the great library at

Rochester. She is building one in secret and discovering that it can help her outplay a game champion, solve routing problems, decode encrypted messages, and much more, much more efficiently and quickly than any mere human can. Yet her "calculus" uses humans—armed with abacuses!—instead of transistors. The key is breaking calculations down into repetitive elements to be performed quickly and reliably by human "components" arranged just so. And once she gets rid of the subjective element, it works (it really would, too).

Of course, the human element remains. Her calculus components do need some rudiment of arithmetical skill, so she must recruit and kidnap to build her machine. Her guards find love among the components (so does she!). As the calculus succeeds, it shifts balances of political power, creates rivalries, and—as she repeatedly insists—"remakes the world." Human jealousies and frustrations create currents that will sweep beyond the reach of the beam-flash culture to desert nomads and result in a threat to civilization. A rake will become a hero, a noble right hand a mighty opponent, and awesome relics of an age ago will be revealed.

Of course, Zarvora has a secret agenda. She is building her calculus for a purpose, and all those human elements get rather in the way. I can't be too specific about her aims, but early on McMullen makes it clear that the technology that built the sunshade is still active, as are the battle stations, and the Highliber clearly wishes to do something about them.

How can such primitive technology reach into space? Here McMullen displays considerable cleverness. He's quite convincing, as he indeed is in most other aspects of this very satisfying saga of empire and technology. You'll enjoy it.

L. E. Modesitt, Jr., is a writer deeply concerned for the impact of humanity upon the world. This concern shows

clearly in fantasies such as *The Order War* and science fiction such as the *Ecologic Envoy* series and *The Ghost of the Revelator* (reviewed here last January). It is thus no surprise to see it again in his latest, *Gravity Dreams*.

The setting is a far-future Earth whose societies, such as Dorchia, are dedicated to maintaining a rather paranoid status quo. Long before, the Ancients turned themselves into "demons" and nearly destroyed the world. Sensible people prevailed, however, exterminated the demons, and devised ways to detect and destroy any demons they found thereafter. They have some high-tech toys—transportation is by "gliders" that seem to use some sort of anti-gravity propulsion—but most of their efforts are devoted to stabilizing philosophies such as Dorchia's Zenlike Dzin, which emphasizes seeing things as they are.

Now meet poor Tyndel, running for his life from the demon-hunters. Just a few days before, he was a junior master of Dzin, tasked to be a hinterland town's schoolmaster. Faced with a smartass kid, he confronts the boy's father and is made captive in a cave, bound, and infected with the dust that creates demons.

In due time, armed with demon-strength, he bursts his bonds, smashes his way out of his prison, and returns home to find those demon-hunters at the gate. They murder his beloved wife, and he starts running toward the border with Rykasha, the land of demons.

He comes to in a bed. A woman, Cerelle, is there to tell him the demon secret is nanotechnology—nanites—that give health and longevity, strength and power. Also, she says, you owe us for saving you. We think you'll make a great starship pilot.

"Like hell!" cries Tyndel. Despite his Dzin, he just cannot accept what he sees. Boneheaded and stubborn, he is shipped off to a distant space station to pay his debt to demon society with grunt labor. Yet eventually he does come

to realize how that society is organized: Any high-tech society suffers from a conflict between enabled power and human folly; it can survive only if everyone behaves responsibly, accepting and paying debts such as his own.

Those who refuse to behave responsibly are “adjusted” with special brain nanites. Because the process impairs mental functions, the Rykashans go to some lengths to bring people such as Tyndel around without it. In his case, they succeed and he winds up fulfilling all the fondest dreams for his future.

There’s a maguffin, of course—a mysterious anomaly in space that interferes with interstellar travel. Some think it’s God. Modesitt tells us that it has something to do with nanotechnology though he gives no basis for that beyond the simple claim. Whatever, Tyndel winds up solving most of the mystery and establishes himself as a hero.

The space adventure side of the tale will be all that many readers want, and they will be thoroughly satisfied. Modesitt never fails on that level. But he is more than an adventure writer; he is also quite a thoughtful fellow, and I found his musings on the need for responsibility in a high-tech society the more fascinating aspect of this novel.

Ken MacLeod deals with nanotechnology too, in *The Cassini Division*, but he is considerably less thoughtful about it. After a period of chaos marked by the Fall of Capitalism, the “Green Death,” when the environmentalists waged war to save the world, and the Crash, when computer viruses destroyed the basis of civilization, humanity is flourishing thirty billion strong. Capitalism is dead, replaced by a triumphantly anarchistic sort of communism, the Greens are extinct, and the Outwarders, who spawned those viruses, remain to be dealt with. Nanotechnology has made people virtually immortal and replaced electronic computers with mechanical Babbage engines built of nanoscale parts

(they are apparently less subject to computer viruses).

Who are the Outwarders? The rich, the powerful, and the nerds fled Earth’s chaos for space and wound up at Jupiter, where they downloaded themselves into virtuality, became the “fast folk,” went mad, and attacked with those viruses. Their slaves, human minds bound to robot bodies, escaped through a wormhole to New Mars, ten thousand light-years yonder.

Now meet Ellen May Ngwethu. A thorough and appalling bigot about artificial intelligences and mental downloads, she believes that only meat counts and that competitors for meat humanity’s seat on the pinnacle of creation must be exterminated. She is also a leader of the Cassini Division, the elite military force that guards the border against the Outwarders and dreams of destroying them utterly. She is on Earth, hunting out the old physicist whose past work made the wormhole possible, hoping to learn how to pass through it to visit New Mars. She finds him, but he will cooperate only if the Division tries to negotiate with the Jovian Outwarders instead of attacking outright. Ellen controls her bigotry, goes along, and discovers that the Jovians seem much more benign than history suggests.

Through the wormhole, then, and here is New Mars, where AIs are recognized as persons, of all things! Rampant capitalists are eager to send a fleet back through the wormhole to trade with the Jovians, and so they do. The plans to attack the Jovians are cancelled and Ellen is chastised, but she is firm in her paranoia. She prepares a backup plan just in case the Jovians prove treacherous.

Ellen is a classic hero—the Old Guard on the ramparts, ready to be proved right and to win the day and then to retire into the depths of a cave until her time rolls round again. She is wrong-headed and insane, but one has to admire her determination and persistence and applaud her for yanking the prover-

bial chestnuts out of the fire.

No matter how wrongheaded or nuts they be, says MacLeod, such folks are useful. I suspect he also wishes that communism had not proved to be such an abject failure.

Peter Watts's *Starfish* is a decent novel that suffers from bad blurbing. The back cover trumpets that "An ancient enemy of humanity is rising out of the depths of the ocean" quite as if we have here a case of intrepid heroes meeting the Thing from the Depths. But there is nothing in the tale that remotely resembles that, and the reader, expecting to meet the Thing at every turn of a page, is constantly disappointed.

The tale begins with a visit to a rift zone deep in the Pacific, where normally small abyssal fish grow for some unknown reason to monster sizes. A power plant is being built here (and at other such zones), and people will live on site to maintain it. Who? Meet the first two, one relatively normal, one twisted by a past of abuse. The latter can stand the constant exposure to hazard—including attacks by monster fish one can tear apart with bare hands—while the former breaks and leaves. The Powers That Be pay attention, and when the deep base is fully staffed, the staff members are as strange as their environment. They get stranger, too, for something about that environment creates in them an empathy that is almost telepathy.

Then they find a strange device not far from their base. It has a "brain"—a smart gel constructed of neurons—and it is radioactive. Indeed, they soon realize, it is a large nuclear bomb, and its brain is running simulation after simulation to figure when an explosion, right here on a major crack in the planet's crust, would have maximal effect on coastlines over yonder.

Why? No one knows. But now there's a visitor, a psychologist studying the crew's functioning. When he returns to the surface, he is quarantined; eventual-

ly he is told that there is a strange bug in the deeps. It's responsible for the local gigantism, and its chemistry is different; a holdover from the dawn of life on Earth, it lost the Darwinian competition. But people are worried. . . .

And smart gels are taking over more and more human jobs.

I suppose the blurb-writer's "ancient enemy of humanity" has to be the primordial bug, but since humanity has never met it before, the label is a bit off. Watts's true enemy is much more human stupidity, the sort of thing that turns children into walking disaster zones, treats adults as interchangeable things, insists that unchecked fertility is a Good Thing, and blindly trusts that our artificially intelligent creations (smart gels) must share our priorities. That is indeed an ancient enemy, and it may in fact be our undoing.

As Watts develops that point, he tells an absorbing tale set in a bizarre world and hinging upon intriguing technology. He's done his homework well, and it shows. The book's single greatest flaw is surely its last few paragraphs, so madly desperate that they damage the suspension of disbelief at the very last possible moment.

Greg Egan's *Teranesia* is both intriguing and topical. It opens on a tiny island in the sea off Indonesia, where Prabir Suresh minds his baby sister, Madhusree, while his parents research local butterflies whose organs and life cycle are not quite like those of any other butterfly on the planet.

Prabir is intelligent, imaginative, and creative, and in this lies disaster. He goes to school via the 'Net, where he also chats with strangers from all over the world. Warned by his parents not to reveal personal details, he borrows his father's name and history. He also poses as a sympathizer of the anti-government revolutionaries. It is thus not surprising that when Indonesia erupts in political turmoil, he becomes an orphan. Nor

that he blames himself.

Yet he is a resourceful chap. He gets himself and Madhusree into a boat and gets to another island. In due time, they reach a refugee camp and then an exceedingly empty-headed postmodern intellectual relative in Toronto. And years later, when they are both young adults, Madhusree gets a chance to join an expedition to Indonesia to investigate a flurry of strange creatures whose anatomies are different from those of any of their kin.

Surely, he thinks, the old home island must be involved. Madhusree will be in danger. He thus opposes the trip, and when she goes anyway, he follows, hoping to protect her.

Of course, his real reason, secret perhaps even to himself, is guilt. And kid sis is no longer a kid; she really can take care of herself. But Prabir hasn't caught on to a number of things yet. Go he must, and fall in with a researcher so that he—and the reader, of course—gets to see what is really going on: sudden changes in genomes, not just random mutations, but drastic leaps due to a mysterious molecular mechanism of unknown origin. And a hint that it can effect people as well as butterflies and birds, plants and snakes.

Teranesia works in several ways—character, plot, science, politics. It entertains and satisfies, and if you feel as I did that Egan stopped a bit short of what could have been an astonishingly nifty revelation, please consider that perhaps the unimaginable is best left unimaginable.

Rudy Rucker has made a name for himself as a writer of both science fiction and popular science (e.g., *Infinity and the Mind* and *The Fourth Dimension*). In my opinion, he is stronger in the latter role, for his fiction, though it is often based in the math of infinity and extra dimensions, tends to be quite light.

So what can we say of his latest,

Saucer Wisdom? It claims to be “a non-fiction novel,” “a work of popular science speculation.” As a novel, it's as light as anything he's ever done. As pop sci, it's intriguing and outlandish and more than a little egoistic (the saucer folks, through their intermediary, assure Rucker that people will still be reading this book two millennia hence!).

The premise is that Rucker has met a strange character named Frank Shook, who says he has gone for rides in flying saucers, forget all that malarkey about Grays and sexual molestation, and here's the dope on what they've told him about paratime. Rucker visits the Shook shack and discovers that his informant contacts the aliens by setting up a multiple feedback rig involving three TV sets and video cameras. They then abduct him, returning him in the same instant, and “Suuurree!” says a skeptical Rucker. Except that Shook now has a sheaf of notes on what the aliens told and showed him while he was gone.

Now we hear of life boxes and dragonfly cameras, a TV (UV—universal viewer) system with as many channels as we now have web pages, piezoplastic (it contracts under electrical impulses) sewer cleaners, dildos, vehicles, and fabrics, radiotelepathy, and more, more, more. Not much will be unfamiliar to the science fiction audience, which has seen such things in a host of stories over the last few decades. The general audience will be more impressed, for this is not the sort of thing they have encountered in *Discover* or *Popular Science* or their favorite Sunday supplement.

And just perhaps, Rucker's prognostications will turn out to be on the money. Keep an eye out for any mention of piezoplastic in the business news.

Michael Ray Taylor, professor of journalism, brings us **Dark Life: Martian Nanobacteria, Rock-Eating Cave Bugs, and Other Extreme Organisms of Inner Earth and Outer Space** as a fascinating account of living things

most of us are totally unaware of. He is a bit partisan about the "bacterial" forms in the Martian meteorite, which now seem quite clearly to be mineral artifacts, but there is no real question about the bacteria found in deep caves and deep-sea rift zones (as well as embedded in rock drilled from deep beneath our feet). With his focus on cave bacteria (not surprising since he is a prominent caver), he tracks their discovery and the realization that their activities may be responsible for dissolving classic caverns such as Carlsbad from the bedrock. Similar bacteria may even be responsible for kidney stones and other ailments.

Entertaining, informative, and worthy of your attention.

I recently heard from David Brin, who wanted to recruit my assistance in his effort to encourage kids to read SF. He has agreed to underwrite the first and second prizes in a contest—to be promoted and coordinated by this magazine—designed to encourage and reward the development of Web sites that assist educators in using SF to liven up their curricula. *The contest has yet to be officially announced*, so don't get excited yet. Do,

however, think of what you might do to earn a piece of David's money.

You could begin by looking at Julie E. Czerneda's *Packing Fraction & Other Tales of Science & Imagination* and *No Limits: Developing Scientific Literacy Using Science Fiction*, reviewed here in the July-August column. You could also get a copy of Jack H. Stocker's *Chemistry and Science Fiction*, which grew from a symposium of that name at the Spring 1992 meeting of the American Chemical Society. It contains some pretty basic history of the field, essays that focus on chemistry in SF (e.g., Asimov's Thiotimoline stories), in Sherlock Holmes, and in *Star Trek*, and three reprinted stories. Of particular interest in this context are three essays on "Science Fiction: A Classroom Resource," "Using Science Fiction to Help Teach Science," and "Space, Time, and Education."

Another potentially helpful book is Jeanne Cavelos's *The Science of Star Wars*, which covers much more than chemistry—there are robotics, biology, astrophysics, and more—and provides a reading list of additional titles (and a few Web sites). ■

Corrections

"Red Sky at Morning," by Ben Bova, published in our May issue, was mistakenly listed as a novelette when it is, in fact, a novella.

"Beamriders," by G. David Nordley, in the July/August issue had a few errors in Figure 5: the text above the upper graph line should read simply "Number"; the solar power stations were intended to be 1000 MW, or 1GW units, as in the text of the article. The legend on the lower line should read "Power in 1×10^{21} Joules/year". The text below gives power levels correctly in Joules per year. Also, on page 61, the third star mentioned in the second paragraph should be Lacaille 9352 instead of Lalande.

In the Brass Tacks section of the September issue, Jeffery D. Kooistra's letter was in response to Stephen Gillett's letter in the April issue.

Stan:
I found Steve Gillett's article on Planets X fascinating; but there is an interesting add-on.

While the story of the 1846 "simultaneous" discovery of Neptune by Adams and Leverrier is well known, less well-known is that they came up with two entirely different predictions—and both were wrong! It took Adams two years and Leverrier one to do the computations, and no one was about to spend a lifetime checking their arithmetic!

Leverrier had the better prediction, another reason he is credited with the discovery. He predicted that the unknown planet would have a mean solar distance of 35 to 38 AU and an orbital period of 207 to 233 years. Neptune is actually 30 AU out and takes 164 yrs. to orbit the sun. Not bad, you say? But if Leverrier had performed his calculations forty years earlier (or later) the predicted position of Neptune would have so far off the actual that finding it would have been impossible! (Come to think of it: were there any such failed predictions?)

The reason for the discrepancy was that to add epicycles (Oops, I mean, perturbations) to the pure Keplerian orbit, one needs to know the masses of the n bodies involved. Neptune then being then undiscovered country, its mass had to be guessed at. Leverrier guessed that Neptune would be 32 Earth-masses, whereas it is only 17. (Adams had guessed 45 Earths, which is why he was so much farther off.)

At the root of it all is the sad fact that Newtonian dynamics is ultimately indeterminate, an early example (as Poincare showed) of what is now misnamed a "chaotic" system. Trajectories can be predicted to a certain horizon (T) with a

certain error (E), and the one must be traded off against the other. It is not just that the n -body problem is unsolvable analytically; it is not solvable computationally! Increasing the number of bodies by 10x increases the number of gravitational interactions by just under 100x and the computations by 1000x. In the "long run," the positions of the planets are indeterminate. As Poincare showed, we cannot know from perturbation theory whether the Earth will eventually fall into the Sun or fly off into space! There are simply too many bodies involved and T is so great that E becomes uselessly large. Maybe q-bit computers will save the day. In the meantime, fortunately, for practical purposes, we can achieve acceptable errors for the time horizons we are usually interested in.

MIKE FLYNN

P.S.: I have a note somewhere about a publication in the 1890's that explained the orbit of Mercury in purely Newtonian terms. I'll see what I can dig up about it.

Dear Stan,

"Red Sky at Morning" was quite interesting and enjoyable.

A minor complaint from a survivor of many New England snowstorms.

If the hatch was on the lee side of the rover, it would have been buried in dust from the 200 MPH sandstorm. Snow (or dust) tends to be blown away from the windward side and to settle on the lee side. It would have been better to park the rover heading into the winds. Both sides would have been swept clear by the wind, the wind would not have very much surface area to push against to rock the rover (or push it over) and it

would present a small target for any windblown debris or small rocks.

Overall, a 9.5 rating.

PAUL HIRTH

Dear Stan:

The May 1999 "Alternate View" asks what the implication of an accelerating universe is for science fiction. The implication is that the universe is infinite, and therefore contains an infinite number of galaxies like the Milky Way, an infinite number of solar systems like ours, and an infinite number of planets like the Earth, in all stages of evolution—past, present, and future. This replaces space and time travel by space-time travel. If you want to go to another time, you don't have to build a time machine or visit another universe. All you have to do is find an Earthlike planet which happens to be at that time in its history that you want to go to.

In an infinite universe, it might seem as if this would take forever. But a determined Don Quixote could "reach the unreachable stars" by converting himself to radiation and traveling at light-speed.

In doing this, he would be exploiting Einstein's Special Theory of Relativity, which says that the Lorentz-Fitzgerald length contraction reduces his traveling time to zero, by nihilizing the distance along his line of flight. He can go anywhere in no time!

However, he can't go home again (the old saw prevails), because while no time passes in his frame of reference, any amount of time could pass on Earth. Fortunately, the old saw, "There's no place like home," does not prevail. In an infinite universe, there are an infinite number of places like home!

All he has to do is pick another Earthlike planet and go there at the time in its history when he left the original Earth. The only difference is that there will be another Don Quixote there getting ready to leave as he arrives. The twins can then discuss their paradox. If some-

one exactly like you comes knocking on your door, you'll know what it means.

The best way to travel light is to convert yourself to neutrinos, the most penetrating form of radiation. That way, if you happen to run into a few stars along the way, you'll go right through them, and be none the worse for it. Black holes could still be a problem, but you can chart them out of your course, because they're few and far between.

Neutrino conversion is all the better because it is thought that neutrinos have a minimal mass which will slow you down enough so that you will have time to think during your journey, but not enough time to get bored. If you convert yourself to photons (truly massless particles of light), you'll become an entity that "lives fast and dies young," because you'll get anywhere in no time, but the first thing you run into will absorb you.

The basic principles of spacetime travel are all discussed in the book *Six Not-So-Easy Pieces*, by Richard P. Feynman (Helix, Reading, Mass., 1997). The Lorentz contraction (p. 63) is the mechanism of transport, and the time dilation or twin paradox (pp. 77-79) is the problem. Neutrino conversion minimizes your transit time and collision risk, but maximizes the time dilation, so you must find another Earthlike planet to go home to.

A practical and reversible method of neutrino conversion is the major experimental problem which must be solved. It is theoretically possible, but definitely the stuff of science fiction rather than fact at this time. Hopefully, the Third Millennium may change that.

KENNETH J. EPSTEIN

Dear Stan,

Perhaps due to the influence of *Star Trek*, it seems to be universally accepted that modifications applied to an organism's DNA will result in immediate and drastic changes in morphology. Because I have never seen any indication (beyond

Hollywood) that this is so, I found suspension of disbelief rather difficult while reading Bill Johnson's "The Vaults of Permian Love" in the May 1999 *Analog*.

Has there ever been any evidence published that replacing all of one's DNA will result in new instincts and behaviors, dramatic enhancements to certain senses, and the appearance or disappearance of entire organs, all within the space of a week?

That aspect of the story seemed so unnecessarily farfetched that it distracted from Mr. Johnson's fascinating premise: That our DNA contains vestigial remnants of an unknown third gender in our ancestry, with the implication that those remnants might possibly manifest themselves today as homosexual tendencies.

That premise, however, may suffer from a misconception about gender, and what defines it: genitalia, chromosomes, or culture? Each definition can give different answers! I refer to an article titled "What are you?" from the Baltimore Sun (17 March 1996, Page 1F, or see

<http://songweaver.com/gender/whattru.html>), in which William Beeman reported: "... all humans, no matter what their chromosomal makeup, have the biological capacity to develop either male or female genitalia and secondary sexual characteristics while in the womb. Developmentally, some babies are born with male or female chromosomal makeup and with both male and female genitalia, or with some of the genitalia of the opposite chromosomal sex. Dr. Fausto-Sterling [Division of Biology and Medicine at Brown University] points out that there is a smooth continuum between 100% biologically male and 100% biologically female with many possibilities in between."

Food for thought. Despite my musings above, I enjoyed the way Mr. Johnson told the story, and I hope to see more from him in the future.

ALEX MATULICH

Mr. Schmidt:

Is it possible that neither you nor Mr. Johnson ever read *Protector* by Larry Niven?

I had the ending in my mind within a third of the story. Outside of the spin on homosexuality there was nothing even remotely new in this story. While well-written, I cannot see that this would be a "new" nor a groundbreaking story.

I believe you owe Mr. Niven an apology.

BILL BURNS

As far as I know, neither of us read Protector, so apologies would hardly be called for even if the stories were accidentally quite similar. But, by your own admission, they're not; what you dismiss as "Outside of the . . ." is new, significant, and central to Mr. Johnson's story!

Dear Stan:

Your editorial of May 1999 issue was most appropriate. It brought to mind some interesting comparisons I made in the past. My grandfather was a civil engineer at the turn of the twentieth century. Amongst his books I read as a child in the 1930s was a science fiction bit by Rudyard Kipling (not generally known for writing in that genre.) He predicted the world of the 1950s from the position of the year 1900. His world was populated by super steamships (the Titanic had not yet been built), and super dirigibles antedating even Graf von Zeppelin's wonders of the early twentieth century, totally missing the concept of heavier-than-air-craft. The Wright brothers had not yet been to Kitty Hawk. Jets and reaction rocket motors were unknown.

Of course, in the 1950s dirigibles had literally left the scene and blimps usually were found covering sports events after yeoman duty spotting submarines in WW II. My grandfather, who had practiced civil engineering with the Pennsylvania Railroad in the days of steam, never believed diesel locomotives would populate the rails of the latter half of the twentieth century, although he helped build electri-

fied lines for the Pennsy still in use today. Diesel locomotives are still not efficient.

There are many factors that impede or steer progress; sometimes economics or the marketplace supply and demand factors take a part. Sometimes good ideas like fuel cells or long life NiCad batteries (in Europe after 1900) are hidden for ulterior motives. The oil-fueled auto industry protects its interests and will continue to do so until the oil in the planet runs out. Electric vehicles are terribly inefficient, and the electric producing networks use much fuel. Atomic power, though efficient, has become an unpopular pariah! The worst part of atomic power is waste disposal. Half-lives of thousands of years stay around to haunt humanity. Nearly everybody who worked with Fermi died from radiation poisoning.

In the 1970s I saw demonstrations of HDTV. It did not stir up much interest. The problem basically is this: The picture on most 20-inch or smaller NTSC analog televisions is quite satisfactory. Most people today with two or three TVs per household hardly every buy as big as 26-inch screens. They are not going to see the merit of HDTV's sharper images and digital characteristics with a price tag of no less than \$5000, and in many instances twice that amount. And yet, the FCC expects the marketplace to keep pace, and eventually the sets may become cheaper (but, only if popularity picks up). The FCC plans to pull the plug on NTSC analog TV within fifteen years, but the TV networks are not too happy to have to fill (and pay) the bill for this unpopular gift the FCC is making to the people whether they want it or not!

There was no poll taken, nor a referendum as to whether the public wanted to make the change which the FCC hopes will free much spectrum space for other lucrative projects. There are many technical problems yet to be solved. I'm not making book on NTSC going away in fifteen years; the FCC has changed its mind before, particularly if something is unpopular enough.

FM came along in the 1940s, changed in the 1950s, and has yet to put old AM radio out of business. There are more of all kinds of stations today than ever before!

In closing, progress does not always follow the simple or common sense in its course through time! Best regards. Your editing is great and reminiscent of my old friend, John W. Campbell, Jr.

JAMES F. PINKHAM

Dear Stanley,

In your May 1999 article on "One Crystal Ball, Slightly Used" you state: "But, so far, to the best of my knowledge, they haven't reached the point of salespeople holding up samples for individual consumers to examine and ask questions about." What about QVC, the shopping network? I believe you can also phone in and ask questions about the merchandise.

Your main points are very well taken. . . . I remember Isaac Asimov telling me that he had been equally surprised to see that First Big Step on the Moon in 1969. He'd thought it would be only a radio contact.

I just hope more of us are wrong about some of the futures we envision.

ANNE McCaffrey

Stanley:

I quibble with you (only slightly) when you say the *Popular Mechanics* article missed the boat when it predicted a television that included radio and phone service.

True, it's not commonplace yet, but I have the feeling it will be before we blink. Only it's not on the TV screen, but on the PC screen. Most of the pieces are in place. Telephone conference calls *are* commonplace. And you can easily access much radio and TV-type programming on your PC. Web cams are all over—people have them for their pet iguanas! And ordinary people *do* make video phone calls over their PCs.

I don't have one, but I knew it was hitting the mainstream when I read an anecdote about it in *Reader's Digest*, of

ANALOG

all the whitebread places. A mother told about making a long distance call to her adult child via computer, then "minimizing" the program will leaving the connection open, in case they wanted to talk later. She forgot about it for hours, until her daughter's voice from the computer suddenly said, "Mom, go to bed! It's midnight!"

When I read this, I was astounded by the casualness of the incident, and the thought of nonchalantly leaving a long distance connection live for hours "just in case."

I think *Popular Mechanics* was surprisingly close to the mark on this one.

SHARI PRANGE

Stan,

There is something that bothers the dickens out of me, every time I hear about our space program, or read a story that incorporates the use of a space suit: What-ever happened to the "wetsuit" type suit that was reported in the pages of *Analog*, back in the sixties, I believe, by either G. Harry, or John W. himself??? It was built, tested, and worked well, as I remember, and was not used, simply because the big money was on the big money suits.

There are a (very) few authors that use this type of suit, and one, I seem to remember, that used a nanotech version of the same. What in the world ever

happened? I (unfortunately) am not an author, but if I were ever to write a story that required a spacesuit, (barring some *real convincing* evidence to the contrary) I would find it impossible to believe that common sense had never reared its head, and would have some sort of skintight roll or Velcro-on-membrane affair and not the cumbersome contraptions that most authors portray, and that the space industry is using still!!

The theory, and everything I know and have heard, lead me to believe that it is not only possible but practical and economical. Is that it doesn't cost tens of thousands of dollars a copy the reason it isn't in use? If so, I wonder how many other things in the "space industry" are being done for the same reasons, and how much in safety and resources is being sacrificed to the same thinking!

I'd very much like to know what's going on with suit thinking lately, and whatever happened to sink the membrane idea so completely.

I wonder how many others also are perplexed at the direction things (in the suit area) have gone! It would make for a great fact article, or an editorial lighting a fire or two under the "powers that be." Please consider the subject. . . .

JEFF SHENK

I'm curious, too. Anybody know? ■

(Biolog continued from p. 81)

An ancient Egyptian papyrus details occupations available to a young man and concludes that best of all is being a scribe. Brian sampled dog walker, paperboy, wedding band and rock musician, butcher, and Wall Street clerk. He opted to become the present-day's two most advanced forms of scribe: a computer programmer who now manages computer systems at a major bank in Charlotte, North Carolina, and a science fiction writer.

Brian shares a self-evaluation with

Isaac Asimov. This explorer of the future said he was raised in unglamorous Brooklyn, went to school by subway and then did nothing more exciting than type. He was ultimately elected to the exotic Explorer's Club.

Both writers were formed in today's equivalent of Babylon, Athens, Alexandria, Rome, and the other epicenters of great civilizations. Isaac had thousands of volumes on his bookshelves. Brian only has to hit a few keys for access to much more. Being a Writer of the Future is what it's all about. ■

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12-14 November 1999

ORYCON 21 (Oregon SF conference) at Portland, OR. Guest of Honor—Nicola Griffith; Artist Guest of Honor—Nene Thomas. Registration—\$35 until 15 October, more thereafter, registration limited to 1600. Info—OryCon 21, Box 5703, Portland, OR 97228. phone—503.232.6506. URL—www.orycon.org/orycon21

12-14 November 1999

PHILCON '99 (Philadelphia SF conference) at Philadelphia, PA. Guest of Honor—Katherine Kurtz, Artist Guest of Honor—Jill Bauman. Registration—\$35 until 31 October, \$40 at the door. Info—PhilCon 99, Box 8303, Philadelphia, PA 19101. phone—215.957.4004. email—philcon@netaxs.com; URL—www.netaxs.com/~philcon

26-28 November 1999

LOSCON 26 (Los Angeles SF conference) at Burbank, CA. Guest of Honor—Connie Willis, Artist Guest of Honor—Alex Ross, Fan Guest of Honor—Joe Siclari. Registration—\$35 until 31 October, \$40

at the door. Info—LosCon 26, c/o LASFS, 11513 Burbank Blvd., North Hollywood, CA 91601. email—loscon26@lasfs.org; URL—www.lasfs.org/loscon26

26-28 November 1999

CONCAT '99 (Tennessee SF conference) at Knoxville, TN. Guest of Honor—Neil Gaiman; Artist Guest of Honor—Lisa Snelling. Registration—\$25 until 10 November, \$35 at the door. Registration limited to 500. Info—Concat 11, Box 1563, Knoxville, TN 37901-1563. phone—423.523.3193. URL—www.vic.com/~chloica/Concat

26-28 November 1999

CHAMBANACON 29 (downstate Illinois SF conference) at Champaign, Ill. Guest of Honor—Andrew J. Offutt, Fan Guests of Honor—Samantha b. Jeude and Donald Cook, TM—Wilson "Bob" Tucker. Registration—\$25 in advance, \$30 at the door. Info—ChamBanaCon 29, Box 2908, Springfield, IL 62708 (you must enclose a SASE). phone—217.753.8934. email—ChamBanaCn@aol.com

31 August-4 September 2000

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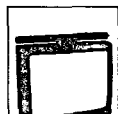
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by Hope Chapman



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